

# JOURNAL *of the* American Veterinary Medical Association

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**D**URING years of plenty, when reasonably satisfactory demand for immunization was generally experienced, coöperation between commercial houses and the profession was the easy, the convenient thing to do.

**I**N periods of stress, the principle of such coöperation is of increasing importance. It is more than a fetish, more than a mode of commercial appeal, more than a self-enlightened plan of operation for the profession. In its application rests the health and wealth of the live stock industry and of peoples dependent on live stock raising.

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# **JOURNAL** *of the* **American Veterinary Medical Association**

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JUNE, 1934

No. 6

## **ON TO NEW YORK**

The Twelfth International Veterinary Congress and the 1934 convention of the American Veterinary Medical Association are now only a little more than two months off. The big week in New York will really start Sunday evening, August 12, with a reception, and wind up the following Saturday evening, August 18, with a post-Congress small-animal clinic. Although some of the details of the program of the Congress still remain to be worked out, the Congress sessions and A. V. M. A. meetings were definitely decided upon at the meeting of the Program Committee, held in Chicago, May 18.

There will be the usual opening session of the Congress, Monday morning, August 13. The sectional meetings will get under way that afternoon and will be continued in the evening. Tuesday morning there will be another general session and the afternoon will be given over to an automobile trip to the Walker-Gordon Farm at Plainsboro, and the Rockefeller Institute at Princeton, New Jersey. In the evening the opening session of the A. V. M. A. will be held. For Wednesday morning another general session is scheduled, to discuss tuberculosis, hog cholera and tetanus, and the sectional meetings will be continued during the first half of the afternoon. At four o'clock, the second session of the A. V. M. A. will be held, and in the evening,

the first meeting of the A. V. M. A. House of Representatives. The banquet for the government delegates to the Congress will be held the same evening.

Thursday morning will be devoted to another general session, at which the subjects of foot-and-mouth disease, Bang's disease, filtrable viruses and milk control will be presented. Sectional meetings will be resumed during the first half of the afternoon and the closing session of the A. V. M. A. meeting will be held at four o'clock. The Congress banquet will be held in the evening.

Friday morning will see the wind-up of the sectional meetings of the Congress, and any sections that have not completed their programs will convene at 1:30 in the afternoon. At three o'clock everybody will go on a boat-ride up the Hudson River as far as West Point, if present plans mature. The closing session of the Congress will be held Saturday morning following a meeting of the Permanent Committee, which will meet again after the adjournment of the Congress. It is expected that the small-animal clinic being planned will be in session most of the day.

Other details of the program of entertainment for the ladies will be announced later. Tuesday morning has been tentatively selected for a breakfast meeting of the Ladies' Auxiliary.

### DUST AND DISEASE

The dust cloud which recently covered a large part of the United States and which did so much damage in various ways has suggested at least one question of considerable interest to veterinarians—the possibilities of the spread of disease germs by the dust. A review of the known facts concerning the phenomenon does not appear to be alarming. The possibilities must be admitted, however, even if the probabilities are not particularly great.

In the first place, dust storms are not new. The one which played such havoc during the second week of May was undoubtedly the greatest in extent, as far as records go, and was the result of a combination of factors: the prolonged drouth over a wide area where thousands of acres of land formerly used for cattle grazing had been plowed for wheat. Other areas, although not plowed, were overgrazed, dry and practically bare of vegetation. Some estimates of the amount of soil which changed places during the several days of the dust storm run into mil-

lions of pounds and seem almost unbelievable. Chicago is said to have received about 6,000 tons.

Dust particles are physically capable of carrying germs, but one of the principal reasons for the existence of dust—dryness—is inimical to bacteria of the non-sporing varieties. Exposure to the rays of the sun while in a much diluted state would probably result in the death of most pathogens if these were to be transported any great distance through the air. However, what about spores of such microorganisms as anthrax or blackleg? Anthrax really suggests a possibility. There have been outbreaks of this disease in recent years in several of the states in the path of the dust storm—South Dakota, Nebraska, Minnesota and Iowa.

If any quantity of matter of an infectious nature—anthrax spores in this case—were to be transported into new territory and widely distributed over pasture land previously not contaminated, the results might be serious. Theoretically, at least, animals in such territory would be more susceptible to the disease than in those localities where anthrax is more or less indigenous and the animals possess some natural immunity.

There is much to be learned concerning the ways in which some of the common diseases are spread. With some infections there seems to be little doubt as to the common or usual modes of transmission—rabies, tuberculosis, Texas fever, Bang's disease. In other cases, we know of possible ways by which infection is spread, but we are still in the dark as to the principal or usual manner—hog cholera, equine encephalomyelitis, foot-and-mouth disease.

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### EXECUTIVE BOARD ELECTIONS

The Executive Board elections being held in District 4 (Alabama, District of Columbia, Florida, Georgia, Kentucky, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia, and Cuba, the West Indies and South America) and District 10 (Michigan and Ohio) will come to a close June 14. The voting in both districts has been heavy, as these elections go. This is a good sign. It indicates that the members in these districts appreciate the importance of exercising their right of franchise in selecting their representatives on the Executive Board, an importance that is continually increasing with the added responsibilities of the administrative body of the national organization. As pointed out last month, there is a wealth of material among the candidates in the two districts. One member in District 4 found it so difficult to make

a selection that he returned his ballot without indicating any choice, but wrote the following beside his signature: "I see three names, all my friends. I can't decide which one to vote for, they are all so good."

It has been pointed out on frequent occasions that electing members of the Executive Board by mail ballot provides a means whereby every member has an opportunity to vote, as compared with the manner of selecting the other officers of the A. V. M. A., something that is done at our annual conventions, in which case only those in attendance have an opportunity to vote. It will be recalled by some that Dr. N. F. Williams, in his presidential address in Chicago last summer, advocated a change to the mail ballot for electing the president of the A. V. M. A. each year. While on this subject, we would like to renew a suggestion that has been made from time to time, namely, that the A. V. M. A. select its presidents one year in advance of taking office. In other words, this means electing a president-elect, who would have one full year to select his cabinet and plan his policies for the year during which he is to occupy the office of president. Many national organizations have been following such a plan for a number of years, and we have not heard of any dropping the plan once it has been adopted. There is much that could be said in its favor.

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### VALUABLE PORTRAITS LOST IN FIRE

The disastrous fire which destroyed part of the Chicago Stock Yards on May 19 has been covered very thoroughly by the various news services of the country, but quite a number of inquiries have been received at the A. V. M. A. headquarters asking for information concerning various structures in the Yards, reported to have been lost in the fire. Radio broadcasters, in the enthusiasm of the moment, terribly exaggerated some of the details of the fire, reported events which did not happen and failed to mention some that actually took place. For example, it was quite generally reported that the U. S. Department of Agriculture Building, housing the B. A. I. offices, was destroyed. As a matter of fact, the building escaped with a minimum of damage, one of the freaks of the fire.

Among the structures that were destroyed by the fire were the Stock Yards Inn, the Live Stock Exchange, the Pure Bred Records Building, the pavilion where the International Live Stock Exposition is held each year, and the Saddle and Sirloin Club. The offices of the Horse and Mule Association of America were a complete loss.

Of particular interest to veterinarians, and something that received but very scant mention in the reports of the fire, was the loss of the gallery of portraits of men prominently identified with agriculture, housed in the Saddle and Sirloin Club. According to authoritative reports, the entire gallery of portraits was destroyed. Buildings and other structures can be replaced, but it will be a very difficult task to duplicate some of the portraits which graced the gallery of the Saddle and Sirloin Club. We understand that the portraits were partially covered by insurance and will be replaced as far as possible.

Some of our older members, particularly those who were in attendance at the Philadelphia meeting of the A. V. M. A., in 1918, will recall that at one of the sessions of that convention, Dr. Fred Eagle, on behalf of Mr. Thomas E. Wilson, of Chicago, presented portraits of three distinguished veterinarians, Drs. D. E. Salmon, A. D. Melvin and J. R. Mohler, to the Association. The portraits were accepted and the Executive Board was instructed to try and arrange for having them placed in the gallery of the Saddle and Sirloin Club. It was suggested that this take place in December of that year, during the week of the International Live Stock Exposition, when many veterinarians would be in Chicago and could be in attendance at the presentation ceremonies. This was done. At intervals, during later years, portraits of other prominent veterinarians were added to the collection, including Drs. J. G. Rutherford, Leonard Pearson, James Law, Henry J. Detmers, Samuel E. Bennett and Marion Dorset.

It is hoped that the lost portraits will be replaced and that additions to the collection will be made from time to time. Why would it not be a good idea to have a special committee of the A. V. M. A., whose function it would be to have this matter in charge? Individual effort and initiative, without any definite program, have been largely responsible for what has been done along this line in the past. If it would be agreeable to the Saddle and Sirloin Club, why not plan to place a new portrait of some distinguished veterinarian in the gallery every two years or at some regular interval to be determined?

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### Manitoba Omits Summer Meeting

The Veterinary Association of Manitoba will not hold a semi-annual meeting during the summer of 1934, according to a recent announcement by the Secretary, Dr. William Hilton, of Winnipeg.

## APPLICATIONS FOR MEMBERSHIP

(See January, 1934, JOURNAL)

### FIRST LISTING

- BARRER, P. G. 291 Main St., Wakefield, R. I.  
D. V. M., Alabama Polytechnic Institute, 1933  
Vouchers: John P. Delaplane and Joseph S. Barber.
- GATES, CECIL L. 10 Washington Ave., Belleville, N. J.  
D. V. M., Colorado Agricultural College, 1932  
Vouchers: Orval L. Gates and Arthur W. Smith.
- MARTIN, F. E. 610 S. High St., West Chester, Pa.  
V. M. D., University of Pennsylvania, 1933  
Vouchers: C. J. Marshall and J. D. Beck.
- MORIN, J. R. Windsor Ave., Rockville, Conn.  
B. V. Sc., Ontario Veterinary College, 1913  
Vouchers: Edwin Laitinen and Geo. E. Corwin.

### Applications Pending

(See May, 1934, JOURNAL)

### SECOND LISTING

- Dean, Ben H., 5701-C Gifford Ave., Maywood, Calif.
- Fanslau, Charles E., 120 Roseville Ave., Newark, N. J.
- Johnson, M. J., Iowa State College, Ames, Iowa.
- Omer, Charles R., 217 Church St., Rahway, N. J.
- Smith, Dwight A., Iowa State College, Ames, Iowa.
- Whitlock, S. C., Iowa State College, Ames, Iowa.
- Wicker, H. E., 209 Welch Ave., Ames, Iowa.
- Workman, Telford Wm., Iowa State College, Ames, Iowa.

The amount which should accompany an application filed this month is \$7.91, which covers membership fee and dues to January 1, 1935, including subscription to the JOURNAL.

## COMING VETERINARY MEETINGS

- Texas, State Veterinary Medical Association of, and A. & M. College of Texas Short Course for Veterinarians. A. & M. College of Texas, College Station, Texas. June 4-8, 1934. Dr. D. Pearce, Secretary, Box 335, Leonard, Texas.
- New York City, Veterinary Medical Association of. Hotel New Yorker, 8th Ave. and 34th St., New York, N. Y. June 6, 1934. Dr. R. S. MacKellar, Jr., Secretary, 329 W. 12th St., New York, N. Y.
- Saint Louis District Veterinary Medical Association. Melbourne Hotel, Saint Louis, Mo. June 6, 1934. Dr. Harley B. Wood, Secretary, 2754 Meramec St., Saint Louis, Mo.
- East Tennessee Veterinary Medical Society. Knoxville, Tenn. June 9, 1934. Dr. R. E. Baker, Secretary, Morristown, Tenn.

- Interstate Veterinary Medical Association. Elks Building, Omaha, Nebr. June 11, 1934. Dr. G. L. Taylor, Secretary, Platts-mouth, Nebr.
- American Association of Medical Milk Commissions. Joint meet-ing with Certified Milk Producers' Association. Statler Ho-tel, Cleveland, Ohio. June 11-12, 1934. Dr. Harris Moak, Sec-etary, 360 Park Place, Brooklyn, N. Y.
- Oklahoma Veterinary Medical Association. Southern Hotel, El Reno, Okla. June 11-12, 1934. Dr. C. H. Fauks, Secretary, 1719 S. W. 15th St., Oklahoma City, Okla.
- Chicago Veterinary Medical Association. Palmer House, Chi-cago, Ill. June 12, 1934. Dr. O. Norling-Christensen, Secre-tary, 1904 W. North Ave., Chicago, Ill.
- San Diego County Veterinary Medical Association. San Diego, Calif. June 12, 1934. Dr. L. K. Knighton, Secretary, 3438 Mountain View, San Diego, Calif.
- Southeastern Michigan Veterinary Medical Association. Detroit, Mich. June 13, 1934. Dr. A. S. Schlingman, Secretary, Parke, Davis & Co., Detroit, Mich.
- Eastern Iowa Veterinary Association, Inc. Mechanicsville, Iowa. June 14, 1934. Dr. Iva Dunn, Secretary, Atkins, Iowa.
- Indiana-Illinois Veterinary Medical Association. Deming Park, Terre Haute, Ind. June 15, 1934. Dr. C. T. Howard, Secre-tary, Carlisle, Ind.
- California State Veterinary Medical Association. (Joint meet-ing with American Association for the Advancement of Sci-ence.) Berkeley, Calif. June 18-23, 1934. Dr. Geo. M. Sim-mons, Secretary, 1386 Golden Gate Ave., San Francisco, Calif.
- Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. June 19, 1934. Dr. C. C. Foulk, Secretary, 1103 E. 47th St., Kansas City, Mo.
- Maryland State Veterinary Medical Association. University of Maryland, College Park, Md. June 21-22, 1934. Dr. Mark Welsh, Secretary, College Park, Md.
- Michigan State Veterinary Medical Association. East Lansing, Mich. June 26-27, 1934. Dr. E. K. Sales, Secretary, 535 For-est St., East Lansing, Mich.
- Mississippi Valley Veterinary Medical Association. Fair Grounds, Peoria, Ill. June 28, 1934. Dr. Lyle A. Gray, Secre-tary, Bushnell, Ill.

- Montana Veterinary Medical Association. Billings, Mont. June 28-29, 1934. Dr. Hadleigh Marsh, Secretary, Agricultural Experiment Station, Bozeman, Mont.
- New York State Veterinary Medical Society. Rochester, N. Y. June 28-29, 1934. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.
- Minnesota State Veterinary Medical Society and University of Minnesota Short Course for Veterinarians. University Farm, Saint Paul, Minn. July 5-6, 1934. Dr. C. P. Fitch, Secretary, University Farm, Saint Paul, Minn.
- Northwest Veterinary Medical Association. (Joint meeting of the Oregon, Washington and British Columbia Veterinary Medical Associations.) Salem, Oregon. July 9-11, 1934. Dr. B. T. Simms, Secretary, Oregon State Agricultural College, Corvallis, Ore.
- North Carolina State Veterinary Medical Association. Joint meeting with South Carolina Association of Veterinarians. Spartanburg, S. C. July 10-11, 1934. Dr. J. Howard Brown, Secretary, Tarboro, N. C.
- South Carolina Association of Veterinarians. Joint meeting with North Carolina State Veterinary Medical Association. Spartanburg, S. C. July 10-11, 1934. Dr. G. J. Lawhon, Secretary, Hartsville, S. C.
- Kentucky Veterinary Medical Association. Brown Hotel, Louisville, Ky. July 11-12, 1934. Dr. E. A. Caslick, Secretary, Paris, Ky.
- Maine Veterinary Medical Association. Gateway Inn, Portland, Maine. July 11, 1934. Dr. R. E. Libby, Secretary, Richmond, Maine.
- Western New York Veterinary Medical Association. Letchnorth Park, near Portageville, N. Y. July 12, 1934. Dr. F. F. Fehr, Secretary, 243 S. Elmwood Ave., Buffalo, N. Y.
- New Jersey Veterinary Medical Association of. Asbury Park, N. J. July 12-13, 1934. Dr. John G. Hardenbergh, Secretary, c/o Walker-Gordon Lab. Co., Plainsboro, N. J.
- Virginia State Veterinary Medical Association. Orange, Va. July 12-13, 1934. Dr. I. D. Wilson, Secretary, Virginia Polytechnic Institute, Blacksburg, Va.
- Missouri Veterinary Medical Association. Missouri Hotel, Jefferson City, Mo. July 17-18, 1934. Dr. Ashe Lockhart, Secretary, 800 Woodswether Rd., Kansas City, Mo.

National Veterinary Medical Association of Great Britain and Ireland. Edinburgh, Scotland. July 30-Aug. 3, 1934. F. Knight, Esq., General Secretary, 2, Verulam Buildings, Gray's Inn, London, W.C.1, England.

Poultry Science Association. A. & M. College of Texas, College Station, Texas. August 7-10, 1934. Prof. D. H. Reid, President, A. & M. College of Texas, College Station, Texas.

Twelfth International Veterinary Congress. Waldorf-Astoria Hotel, New York, N. Y. August 13-18, 1934. Dr. H. Preston Hoskins, General Secretary, 221 N. La Salle St., Chicago, Ill.

American Veterinary Medical Association. Waldorf-Astoria Hotel, New York, N. Y. August 14-16, 1934. Dr. H. Preston Hoskins, Secretary, 221 N. La Salle St., Chicago, Ill.

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### STATE BOARD EXAMINATIONS

Iowa Veterinary Medical Examining Board. State House, Des Moines, Iowa. June 12-13, 1934. Candidates for examination must be in the office of the Division of Animal Industry not later than 9 a. m., June 12. Dr. H. A. Seidell, Secretary, State House, Des Moines, Iowa.

Michigan State Board of Veterinary Medical Examiners. Michigan State College, East Lansing, Mich. June 12-13, 1934. Dr. C. H. Clark, Secretary, State Office Building, Lansing, Mich.

Illinois State Board of Veterinary Examiners. Chicago, Ill. July 5-6, 1934. Dr. L. A. Merillat, president of the Examining Committee, asks candidates to file their applications with the Director of Registration and Education, Springfield, Ill., who will then notify them of the hour and place of examination.

Massachusetts Board of Registration in Veterinary Medicine. Department of Civil Service and Registration, Boston, Mass. July 10-11, 1934. Applications may be obtained from the Secretary. Dr. E. W. Babson, Secretary, Gloucester, Mass.

Virginia State Board of Veterinary Medical Examiners. Orange, Va. July 12-13, 1934. Dr. H. H. Adair, Secretary, Bristol, Va.

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The winds and waves are always on the side of the ablest navigators.—EDWARD GIBBON.

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The secret of success is constancy to purpose.—BENJAMIN DISRAELI.

## A BANG'S DISEASE SURVEY OF A REPRESENTATIVE DAIRY TOWNSHIP\*

By R. R. BIRCH, *Ithaca, N. Y.*

*New York State Veterinary College*

This survey was undertaken in order to clear up certain doubtful points regarding the prevalence and epizootology of Bang's disease. Randolph Township, Cattaraugus County, New York, was chosen because it probably is fairly representative of dairy districts in New York, and of other states as well, in which dairying is an old established industry. The County is "modified accredited" in relation to tuberculosis control and the herds are relatively small. The largest included 63 animals, the smallest, one animal, and 20 was the average. In all, 119 herds containing 2,338 animals were included in the survey.

Dr. William M. Thomson, Branch Veterinary Laboratory, Salamanca, New York, tested the blood samples, and we are indebted to Mrs. Thomson for valuable aid in assembling the data. Mr. C. N. Abbey, County Agent, Salamanca, and Dr. Ralph Knight, Little Valley, N. Y., created and guided the local sentiment that made the survey possible. Dr. O. E. Helms, veterinary practitioner, East Randolph, N. Y., drew all the blood samples.

At the time Dr. Helms drew the blood samples he obtained the following data in each herd.

1. Number of animals under six months of age.
2. Identification numbers of purchased animals.
3. Identification numbers of bulls.
4. Identification numbers of cows that had aborted.

Further data might profitably have been added, but as there was some reluctance on the part of a few to submit their herds to the test, it was deemed inadvisable to attempt too much. The attitude of most of the breeders was one of hearty coöperation.

The multiple-dilution method was used in making the tests, and killed antigen was employed. Dilutions of 1:25, 1:50, 1:100 and 1:200 were set. Maximum agglutinations of 1:50 or lower were read as negative, those of 1:100 or higher as positive, while partial agglutinations at 1:100 with complete agglutination in the lower dilutions were read as suspicious. Unless otherwise stated, we have classed the suspicious animals with the positive, in the tables and text.

\*Presented at the seventieth annual meeting of the American Veterinary Medical Association, Chicago, Ill., August 14-18, 1933.

Table I includes the data that concern individual herds, and table II summarizes pertinent facts relative to the distribution of reacting animals.

From the tables we have assembled and related a few of the most important facts revealed by the survey, principally those that serve to complete the picture of Bang's disease as it occurs naturally, and those that bring out vantage points from which control measures may proceed.

Animals tested .....	2,388
Animals reacting .....	393 (16.5%)
Purchased animals tested .....	329
Purchased animals reacting .....	97 (29.5%)
Native* animals tested .....	1,959
Native animals reacting .....	296 (15.1%)
Herds tested .....	119
Clean herds .....	37 (31.1%)
Herds with only one reactor .....	19 (15.9%)
Herds with only two reactors .....	14 (11.8%)
Herds with only three reactors .....	10 (8.4%)
Herds with only four reactors .....	7 (5.9%)
Herds with only five reactors .....	7 (5.9%)
Herds with more than five reactors .....	25 (21.0%)

In the 94 herds containing five or less reactors each, there were 140 reactors among 1,691 cattle.

In the 25 herds that contained more than five reactors each, there were 253 reactors among 705 cattle.

Native herds tested .....	84
Clean native herds .....	31 (36.9%)
Herds tested that contained one or more purchased animals .....	35
Herds clean .....	6 (17.1%)
Abortions reported among 392 reacting females .....	45 (11.5%)
Abortions reported among 1,885 clean females .....	26 (1.4%)
Relation of abortion rate in reacting cows to the rate in clean cows .....	9 times
Bulls tested .....	110
Bulls reacting .....	1
Largest herd tested .....	63
Smallest herd tested .....	1
Average size of herds tested .....	20+
Average size of herds that contained more than five reactors .....	28+
Animals less than six months of age and not tested....	186

Some of the incidental points will be considered first. One of these relates to the number of animals on hand less than six months old. There were only 186 of these reported, to 2,388 animals more than six months old, but it must not be assumed that the herds, as a group, are not adequately supported by young stock. It is important to take into account that the tests include many young animals more than six months old; that the survey

\*Animals born in the herds in which the survey found them.

TABLE I—*Bang's disease survey of Randolph Township, Cattaraugus County, New York.*

HERD	TOTAL ANIMALS TESTED			TOTAL ANIMALS TESTED	CATTLE UNDER 6 MONTHS	TOTAL ANIMALS IN SURVEY	PURCHASED ANIMALS TESTED			REPORTED ABORTIONS		
	REACTORS	SUS-PICIOUS	CLEAN				REACTORS	SUS-PICIOUS	CLEAN	REACTORS	SUS-PICIOUS	CLEAN
1	4	0	25	29	2	31	2	0	3	0	0	0
2	4	1	45	50	10	60	0	0	3	2	0	3
3	0	0	41	41	13	54	0	0	2	0	0	0
4	5	0	19	24	0	24	0	0	0	0	0	0
5	4	0	3	7	0	7	2	0	3	2	0	0
6	4	1	30	35	0	35	0	0	4	0	0	0
7	0	0	32	32	4	36	0	0	13	0	0	0
8	0	0	3	3	0	3	0	0	1	0	0	0
9	7	1	15	23	5	28	1	0	1	0	0	1
10	10	1	23	34	10	44	1	1	5	0	0	0
11	1	0	9	10	0	10	1	0	6	0	0	0
12	1	0	3	4	0	4	1	0	3	0	0	0
13	15	3	30	48	16	64	0	0	0	1	0	0
14	3	1	19	23	0	23	0	0	0	0	0	1
15	11	0	24	35	5	40	4	0	8	3	0	0
16	3	0	30	33	7	40	0	0	0	0	0	0
17	0	0	23	23	0	23	0	0	0	0	0	0
18	2	0	35	37	0	37	1	0	1	0	0	0
19	2	0	7	0	0	9	1	0	0	0	0	1
20	0	0	13	13	0	13	0	0	0	0	0	0
21	2	1	8	11	0	11	0	0	0	0	0	0
22	0	0	7	7	0	7	0	0	0	0	0	0
23	0	0	16	16	0	16	0	0	0	0	0	0
24	1	0	5	6	0	6	1	0	3	0	0	0
25	0	0	13	13	0	13	0	0	0	0	0	0
26	0	0	6	6	0	6	0	0	0	0	0	0
27	13	2	48	63	0	63	3	2	15	0	0	1
28	3	0	6	9	3	12	0	0	0	0	0	0
29	4	0	35	39	0	39	4	0	24	0	0	0
30	3	0	24	27	4	31	0	0	0	0	0	1
31	0	0	3	3	0	3	0	0	1	0	0	0
32	1	0	1	2	0	2	0	0	0	0	0	0
33	1	0	23	24	0	24	0	0	1	0	0	0
34	7	0	26	33	3	36	2	0	2	2	0	0
35	0	0	13	13	0	13	0	0	0	0	0	0
36	0	0	2	2	0	2	0	0	0	0	0	0
37	7	0	44	51	1	52	0	0	0	0	0	0
38	5	0	5	10	0	10	5	0	5	0	0	0
39	3	0	7	10	0	10	3	0	2	0	0	0
40	1	1	17	19	0	19	0	0	0	0	0	2
41	0	0	50	50	2	52	0	0	0	0	0	1
42	18	0	34	52	2	54	18	0	34	2	0	2

TABLE I—*Bang's disease survey of Randolph Township, Cattaraugus County, New York—Continued.*

HERD	TOTAL ANIMALS TESTED			TOTAL ANIMALS TESTED	CATTLE UNDER 6 MONTHS	TOTAL ANIMALS IN SURVEY	PURCHASED ANIMALS TESTED			REPORTED ABORTIONS		
	REACTORS	SUS-PICIOUS	CLEAN				REACTORS	SUS-PICIOUS	CLEAN	REACTORS	SUS-PICIOUS	CLEAN
43	1	0	16	17	0	17	1	0	16	0	0	0
44	0	1	31	32	0	32	0	0	0	0	0	0
45	0	0	24	24	3	27	0	0	0	0	0	0
46	5	0	9	14	0	14	5	0	7	0	0	0
47	1	0	44	45	2	47	0	0	0	0	0	0
48	7	0	11	18	4	22	0	0	0	0	0	0
49	5	0	1	6	0	6	0	0	0	0	0	0
50	0	0	40	40	4	44	0	0	0	0	0	0
51	8	0	7	15	3	18	0	0	0	8	0	1
52	0	0	16	16	0	16	0	0	0	0	0	2
53	6	0	13	19	2	21	0	0	0	1	0	0
54	3	0	15	18	1	19	0	0	0	0	0	0
55	0	0	19	19	0	19	0	0	0	0	0	0
56	2	1	10	13	0	13	0	0	0	0	0	0
57	0	0	25	25	3	28	0	0	0	0	0	1
58	0	0	22	22	0	22	0	0	1	0	0	0
59	1	0	22	23	0	23	2	0	0	0	0	0
60	11	1	25	37	3	40	0	0	0	1	0	0
61	2	0	33	35	2	37	0	0	0	0	0	0
62	0	0	20	20	2	22	0	0	0	0	0	1
63	0	0	19	19	4	23	0	0	0	0	0	2
64	2	0	12	14	0	14	0	0	0	0	0	0
65	0	0	17	17	0	17	0	0	0	0	0	0
66	13	0	22	35	6	41	0	0	0	1	0	0
67	4	1	24	29	4	33	0	0	0	0	0	1
68	0	0	6	6	1	7	0	0	0	0	0	0
69	12	2	21	35	0	35	12	2	21	0	0	0
70	13	0	8	21	3	24	0	0	0	4	0	0
71	2	0	11	13	0	13	0	0	0	0	0	0
72	6	0	10	16	12	28	0	0	0	0	0	0
73	8	0	12	20	0	20	0	0	0	2	0	0
74	2	0	21	23	0	23	0	0	0	0	0	1
75	0	0	13	13	0	13	0	0	13	0	0	0
76	1	0	31	32	0	32	0	0	0	0	0	1
77	2	0	20	22	0	22	0	0	0	0	0	0
78	7	1	7	15	0	15	0	0	0	5	0	1
79	3	0	11	14	nr*	14	0	0	0	0	0	0
80	1	0	0	1	0	1	0	0	0	0	0	0
81	9	0	10	19	0	19	0	0	0	1	0	0
82	7	0	9	16	0	16	0	0	0	0	0	0
83	0	0	16	16	nr	16	0	0	0	0	0	0
84	3	1	8	12	0	12	0	0	0	0	0	0

TABLE I—*Bang's disease survey of Randolph Township, Cattaraugus County, New York—Concluded.*

HERD	TOTAL ANIMALS TESTED			TOTAL ANIMALS TESTED	CATTLE UNDER 6 MONTHS	TOTAL ANIMALS IN SURVEY	PURCHASED ANIMALS TESTED			REPORTED ABORTIONS		
	REACTORS	SUSPICIOUS	CLEAN				REACTORS	SUSPICIOUS	CLEAN	REACTORS	SUSPICIOUS	CLEAN
85	2	0	11	13	0	13	2	0	11	0	0	0
86	10	0	12	22	nr	22	0	0	0	0	0	0
87	4	2	9	15	0	15	0	0	0	0	0	0
88	4	0	6	10	0	10	0	0	0	1	0	0
89	1	0	13	14	0	14	0	0	0	0	0	1
90	1	0	22	23	0	23	0	0	0	0	0	0
91	1	0	1	2	nr	2	1	0	1	0	0	0
92	0	0	16	16	0	16	0	0	0	0	0	1
93	0	0	26	26	3	29	0	0	0	0	0	0
94	0	0	38	38	3	41	0	0	0	0	0	0
95	1	0	18	19	nr	19	0	0	0	0	0	0
96	0	0	9	9	0	9	0	0	0	0	0	0
97	0	0	25	25	0	25	0	0	0	0	0	0
98	2	0	10	12	0	12	0	0	0	0	0	0
99	1	1	17	19	4	23	0	0	0	0	0	0
100	2	0	14	16	3	19	0	0	0	2	0	0
101	1	0	15	16	1	17	0	0	0	0	0	0
102	0	0	2	2	0	2	0	0	0	0	0	0
103	3	0	9	12	3	15	1	0	0	1	0	0
104	1	0	10	11	0	11	0	0	0	0	0	0
105	0	0	16	16	2	18	0	0	0	0	0	0
106	0	0	15	15	3	18	0	0	0	0	0	0
107	13	0	10	23	5	28	0	0	0	6	0	0
108	0	0	15	15	0	15	0	0	0	0	0	0
109	2	0	9	11	0	11	0	0	0	0	0	0
110	2	1	16	19	0	19	0	0	0	0	0	0
111	8	0	5	13	7	20	8	0	5	0	0	0
112	2	0	7	9	0	9	0	0	0	0	0	0
113	0	0	7	7	0	7	0	0	0	0	0	0
114	1	0	6	7	2	9	0	0	0	0	0	0
115	0	0	10	10	0	10	0	0	0	0	0	0
116	3	1	14	18	0	18	0	0	0	0	0	0
117	0	0	12	12	4	16	0	0	0	0	0	0
118	10	0	17	27	0	27	10	0	17	0	0	0
119	1	0	20	21	0	21	0	0	0	0	0	0
Totals	368	25	1,995	2,388	186	2,574	92	5	232	45	0	26

\*Not reported.

was made in April and thus shows a minimum number of calves in herds in which the breeding is done for a fall milk-flow; that a succession of bull calves which are vealed may in any small herd deprive it at a given time of calves on hand less than six months old; that there is a definite tendency away from raising

TABLE II—*Distribution of reacting animals.*

RE- ACTORS IN HERD	NATIVE HERDS			HERDS CONTAINING 1 OR MORE PURCHASED ANIMALS			SUMMARY		
	HERD	ANI- MALS	AVER- AGE PER HERD	HERD	ANI- MALS	AVER- AGE PER HERD	HERD	ANI- MALS	AVER- AGE PER HERD
None	31	536	17.3	6	114	19.0	37	650	17.6
1	12	223	18.6	7	86	12.3	19	309	16.3
2	10	184	18.4	4	68	17.0	14	252	18.0
3	8	144	18.0	2	22	11.0	10	166	16.6
4	4	63	15.7	3	75	25.0	7	138	19.7
5	3	59	19.7	4	109	27.2	7	168	24.0
Over 5	16	390	24.4	9	315	35.0	25	705	28.2
Totals	84	1,599		35	789		119	2,388	

calves during periods of low milk-prices; and that there are a few herds in which the number of calves was not reported.

The abortion rate reported no doubt is considerably lower than the actual. This is true because unobserved abortions, incomplete records, animals purchased after having aborted, and the reticence of some owners in regard to reporting abortions, all are influences that drop the reported rate below the actual. Inasmuch as these influences operate equally on both clean and infected groups, it is probable that the relation between the abortion rate in one group, as compared with that in the other, is essentially correct. Supporting this assumption we have unpublished data covering more complete and accurate records of larger numbers of animals than are reported here. These indicate an abortion rate about twice as high in both clean and infected groups as is revealed in this survey, which leaves the relation between the abortion rate in clean and infected groups essentially unchanged. Collectively the data indicate that the incidence of abortion among infected cows is about nine times that which is observed in clean ones.

The data reveal the basis of an error frequently made in reporting abortion rates. It would be literally true though highly misleading to state, on the basis of our compilations, that there were more than half as many abortions among clean animals as occurred among infected ones, and unfortunately parallel assertions appear frequently in our veterinary literature. Those who so report merely test cows that abort and make their comparisons without knowing or considering the number of clean animals,

and the number of infected animals required to yield the reported number of abortions. When these factors are considered, the correct and complete statement regarding our data is that almost twice as many abortions occurred in 16 infected animals as occurred in 84 clean ones.

It was somewhat surprising to find but one infected bull among 110 that were tested. Data published by Schroeder<sup>1</sup> show 11 per cent of bulls positive to the agglutination test, and Gilman<sup>2</sup> found 35 per cent to be reactors. It is very probable that the low percentage of reactors shown by our data would not be maintained in more extensive testing. The evidence is rather to the effect that bulls and cows react in approximately the same proportionate numbers.

The survey not only confirms the universal observation that it is the large herd, and the one that depends on outside sources for replacements, that suffers most from Bang's disease, but it reveals something of the degree in which these influences operate. More important still, it shows that, despite frequent assertions to the contrary, there are actually a great many herds already free from Bang's disease and a great many others that could be freed with negligible expense and effort. It clearly points out the greatest opportunity available today in the practical control of Bang's disease—that of inducing breeders to test who, for the time being, are having little or no breeding trouble in their herds. The identification and removal of a few reactors, during periods when Bang's disease is quiescent, is a highly effective and relatively inexpensive way of cutting off future losses. This policy must be substituted for the one, now all too common, of rushing frantically and ineffectively to the aid of herds when they are in acute distress, and neglecting to seize and follow up advantages that exist at all other times.

In 37 of the herds tested there is no Bang's disease problem, for a test once or twice a year will in most of them provide ample protection. If we may judge from extensive experience in similar herds, there are approximately 47 others, those that contain five or less reactors each, from which the disease could easily be eliminated by a short succession of tests and the prompt removal of reactors. In fact we have found that even in badly infected herds the disease as a rule readily yields to a well-guided testing program that provides for the elimination or judicious handling of reactors.

In 84 of the cleanest herds tested in this survey there were only 140 reactors. It is in line with our experience to estimate that

at least half of these could profitably be sold for beef on the basis of poor milk-production and faulty breeding alone. There would then remain only 70 of the more choice reactors to be eliminated from the herds. In the 25 badly infected herds, removal of half of the reactors, 126 animals, on the same basis, would enable them to absorb the 70 remaining reacting animals from the relatively clean herds, and at the same time actually to benefit by the change, for selected reacting individuals would be substituted for culls.

If 16 per cent of our dairy cows are blood reactors, their sacrifice for public indemnity is impossible and wrong in principle, and their sacrifice at the expense of their owners is impossible and unnecessary. While a constant and severe culling process should be applied to these animals, we are face to face with the hard fact that many of the best of them must be kept. Our only logical course, then, lies in providing for their judicious handling in the herds of origin, and for a realignment and sane guidance of local sales that will permit them to leave the relatively clean herds in which they are a menace and to enter the badly infected herds in which they are not likely to do harm.

There is encouraging evidence that this realignment is gradually taking place. At the present time a market is developing for selected chronic reactors. One man we know is purchasing choice pure-bred reactors from other breeders who are freeing their herds from Bang's disease. These he obtains at favorable prices, because the seller often has only a few remaining and dislikes the inconvenience and expense of caring for them in a separate group. The calves from these choice reactors are transferred to a clean group on a separate farm when they are about nine months old, and an excellent clean herd is being grown in this manner. This practice commends itself to those who are able to carry it out for it is thoroughly constructive in all its aspects. It enables the owners of herds almost free from Bang's disease to sell the few remaining reactors, it perpetuates valuable pedigrees, and develops clean herds to represent the pedigrees thus perpetuated.

Another encouraging indication of a gradual change in purchasing policy is the increasing demand for rather large groups of clean breeding animals from clean herds. This is replacing the old disastrous policy of purchasing one animal here and another there, on the basis of the test of the individual from herds of unknown status. The best informed breeder is even seeking to purchase from the same herd a foundation unit consisting of

clean unbred heifers and a clean bull, and our most progressive breeders have sensed this demand and are preparing to cater to it.

These are straws that indicate the direction of the current and we must encourage this sure progress. Probably we must expect it to be slow for we still have with us those who cling to the vain hope of doing the same thing in the same way and obtaining a different result. This survey indicates to those who seek to change their methods as knowledge of Bang's disease advances, something of the extent of the task to which they have set their hand, something of the opportunities that lie before them, and something of the pattern with which they must work.

#### REFERENCES

- <sup>1</sup>Schroeder, E. C.: Bureau of Animal Industry investigations of bovine infectious abortion. *Jour. A. V. M. A.*, ix (1922), n. s. 13 (5), pp. 542-561.  
<sup>2</sup>Gilman, H. L.: The relation of the bull to the spread of Bang abortion disease. *Corn. Vet.*, xviii (1928), pp. 159-166.

### Model Dairy Barn

An exhibit that promises to be one of the most interesting at A Century of Progress, in Chicago, this summer is that of the Brook Hill Farm, Genesee Depot, Wis., which will show exactly how certified milk is produced, cooled, bottled and refrigerated.

What is said to be one of the best equipped dairy barns ever built anywhere houses the herd of purebred dairy cows. There is a "milking parlor" where the cows are milked by electrically operated machinery. The dairy building, 200 feet long and 45 feet wide, is topped with an illuminated tower 50 feet high. The building contains, in addition to the stable and milking parlor, a bottling plant, a restaurant, an information booth and a rest room for the convenience of visitors. The stable part of the building is constructed of reinforced concrete to a design patterned after the latest type of European airplane hangar—the first time this type of construction has been used in America. Glass building-blocks, to admit light, and hollow to resist temperature changes, have been used in the construction of the south end of the building where the milking parlor and bottling plant are located. Each cow has a patent stanchion giving free movement, and each has a special, individual, sanitary drinking-cup which the cow operates.

### Farmer Is Suicide When Favorite Horse Dies

When his favorite horse died, Horatio Hudtwalter, a farmer living near Logansport, Ind., felt that life was no longer worth living and committed suicide. Mr. Hudtwalter had owned the horse for several years.

## FAMILIAL INCIDENCE OF LYMPHOCYTOMA IN THREE GENERATIONS OF THE DOMESTIC FOWL\*

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During recent years, while conducting autopsies in our diagnosis laboratory, an increasing number of birds have been found presenting neoplastic changes involving the internal organs. Lymphocytoma of chickens may be defined as a fatal neoplastic disease of domestic fowls, the type cell of which is the undifferentiated lymphocyte.<sup>1</sup>

This report includes the research data collected during a three-year period, from the spring of 1930 to July 1, 1933. The parent stock was obtained at different intervals from flocks in which other birds were known to be affected with lymphocytoma. For genetic reasons two lots of hens were mated in separate pens with a single cockerel. Only two breeds, Plymouth Rocks and White Leghorns, were used. It was desired: (1) to obtain additional data regarding the incidence of the disease as it occurred in the dams and their progeny; (2) to observe the organs and tissues involved in affected birds; (3) to make, at regular intervals, blood examinations of all birds in the experiment; (4) to make further attempts, by experimental methods, to transmit the disease to other birds; and (5) to get descendants from lymphocytomatous birds.

The preliminary report has been made.<sup>2</sup>

### LITERATURE

Pappenheimer and his co-workers<sup>3</sup> reported their studies of "fowl paralysis." They report that the most severe lesions were seen in the peripheral nerves and nerve roots. These lesions consisted essentially of an infiltration of smaller and larger mononuclear cells between the nerve fibers, separating the individual fibers and accompanied by more or less edema. This infiltration was so massive at times as to replace almost completely the nerve tissue. The male gonads, of all viscera studied, seem to be the least favorable site for a localization of the lesion. The authors were unable to demonstrate any microorganisms of etiological significance.

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Doyle<sup>4</sup> described this disease as a neuritis in chickens. It occurred in birds from four to eight months of age. The cause of the disease was considered of an infectious nature, but he was unable to demonstrate the etiological agent. In a later publication Doyle<sup>5</sup> suggested that this disease was transmitted from the hen to the chick through the egg.

Johnson,<sup>6</sup> in a recent publication, included a complete review of the literature with reference to fowl paralysis and the leucosis of fowls. He proposes the term lymphomatosis for the disease in birds with enlarged liver, kidneys and spleen, and, likewise, those having a round-cell infiltration of the peripheral nerves. No leukemic blood-pictures were found associated with the disease.

Warrack and Dalling<sup>7</sup> state that it seems practically certain that the disease may be transmitted through the egg and that the cockerel as well as the hen may be the transmitter. They further state that there is some evidence that transmission may occur by contact between diseased and healthy birds.

Asmundson and Biely<sup>8</sup> presented evidence that hereditary susceptibility or resistance plays an important part in the occurrence of fowl paralysis. Biely and Palmer<sup>9</sup> consider the lymphomatous tumor to be one of the manifestations of fowl paralysis. Biely and Palmer<sup>10</sup> reviewed briefly the available literature on the subject of fowl paralysis, with particular reference to the rôle played by intestinal parasites.

Patterson *et al.*,<sup>11</sup> in their report, state that 754 birds were autopsied. Tumorous tissue was most commonly located as follows: eye 242, liver 162, nerve 158, ovary 47 and testes 12.

Mathews and Walkey<sup>12</sup> state:

The essential pathology of fowl paralysis is found in the nervous system, whereas, the lymphadenomas rarely invade these anatomical structures. It is not uncommon to find large nerve trunks completely surrounded by neoplastic growth but showing no evidence of an actual invasion. In 16 cases of lymphadenomas, derived from flocks in which there was no history of fowl paralysis, sections of the central and peripheral nervous systems were found free of metastases. It would be difficult to find as large a number of cases of fowl paralysis in which typical, perivascular round cell infiltrations of the central nervous system could not be demonstrated. In view of the prevalence of the two diseases it is not surprising that fowl paralysis and the lymphoid neoplasms should be encountered in the same individual. . . . The disease should not be confused with the infectious and contagious disease commonly known as fowl paralysis.

Feldman and Olson<sup>13</sup> have defined lymphocytoma as follows:

Lymphocytoma of chickens is a malignant neoplasm, the type cell of which is the undifferentiated lymphocyte. The lesions consist usually of pinkish gray, to grayish white, diffuse masses or

nodules in the various organs, the viscera of the abdominal cavity being most frequently affected. The neoplastic cells have an extra-vascular relationship, leukemia does not occur, and the disease is not transmissible.

#### EXPERIMENTAL METHOD

All parent stock was wing- and leg-banded in order that accurate hatching records could be obtained. Laying hens were trap-nested and the chicks hatched were pedigreed. For every bird in the experiment there was a separate index card prepared so that its record could be kept intact. This file contained the results of blood examinations made, the final disposition of the bird, and, if death occurred, the cause if determined. If lymphocytomas were found, the record indicated the organs and structures involved. Sections were taken from all neoplastic tissue and from the femoral nerves for histopathological examination. The pedigree of the cockerels for each lot of parent birds is not known. The following year the pullets, first generation birds, were mated to a cockerel selected from a family where other birds were known to have been affected with the disease. The regular monthly blood examinations were begun when birds were three to four months of age. Blood smears were prepared and stained by the Wright method of staining. If pathological features were observed, then complete blood examinations were made at intervals as indicated by the condition of the bird.

For transmission experiments, saline suspensions were prepared from the liver, spleen and heart-blood of birds showing lymphocytomatous organs. The material was put in a sterile mortar and ground, after which the coarser particles were removed by filtering through a thin layer of cotton and gauze. This was then injected intravenously with little apparent harm to the recipients from the particles that remained in the suspension. Intraperitoneal injections also were made. Heparin solution (0.1 per cent) was used as an anti-coagulant. Blood was withdrawn from the wing vein into a syringe in one-tenth of its volume of heparin solution.

An attempt was made to select birds for mating in order to raise disease-free progeny.

#### GROSS PATHOLOGY

Lymphocytoma of chickens is a malignant neoplastic development involving chiefly the various internal organs, the viscera of the abdominal cavity being the most frequently affected.<sup>13</sup> The neoplastic changes of the liver, spleen and ovary are the most prominent, especially to the practitioner. These changes in the liver consist of grayish multiple nodules usually quite distinct

in contour. Sometimes these neoplastic areas actually protrude outward from the surface of that organ. Usually the organ is enlarged. Only one lobe of the liver may show the neoplastic changes, the other lobe presenting no gross changes. Then again, the liver may be greatly enlarged and have a diffuse grayish color. The neoplastic changes of the spleen consist of an enlargement, usually with an even contour, but occasionally grayish nodules may be observed on the surface. It is difficult to describe the neoplastic changes of the ovary. Often they somewhat resemble a cauliflower, or a small cluster of grapes. The kidneys are enlarged in varying degrees and it is not uncommon to find one or both, two to three times the normal size. The heart may show nodules on the surface resembling those lesions seen on the heart of some baby chicks harboring pullorum infection.\* Occasionally the mesentery is thickened and nodular.

#### MICROSCOPIC PATHOLOGY

The neoplasm consists of a compact mass of proliferating, undifferentiated lymphocytes. The neoplastic cells are always extravascular. These cells in the liver are supported by irregular strands of fibrous tissue. Occasionally the areas of proliferating cells are supported by a heavier framework of fibrous tissue. A very slight periportal round-cell infiltration is not uncommonly seen in apparently normal birds. Due to pressure, many of the cells in the compact masses are irregular in shape and the nucleus appears as the main portion of the cell. This pressure causes the cells to be elongated and somewhat irregular in shape. The nucleus quite often is eccentric in location. Occasionally sections of liver tissue are observed that have only small amounts of normal tissue remaining, the latter being replaced by the infiltrated, proliferating, undifferentiated lymphocyte. The histopathology of the ovary is somewhat similar to that found in the liver. Large masses of similar cells are found. This infiltration, if extensive, is at the expense of the normal ovarian tissue. The follicles in such cases are usually very limited in number. Because the spleen is lymphatic in structure, the histopathology is not so marked. The increase in size appears to be due to the large masses of blood and tissue cells. In the tumorous areas in the myocardium, the infiltration consists of a similar type of cell. The neoplastic cells often displace large areas of normal renal tissue. The infiltration is always intertubular, and

\*All birds in this experiment were tested several times with the rapid whole-blood agglutination test for pullorum disease. All birds gave negative results to that test unless so indicated in this report.

lymphoid cells are often found extravascular to the capillaries of the glomeruli.

#### EXPERIMENTAL RESULTS

The following tables are records of the birds hatched during the three years of the experiment. Lymphocytoma in our experience seldom develops in birds less than six months of age.

During the spring of 1931, 100 eggs were purchased from a valuable breeding flock of White Leghorns. The owner stated that 10 per cent of his breeding flock had died showing the clinical symptoms of lymphocytoma. Approximately 15 birds from this flock had been examined in the laboratory to confirm the diagnosis. None of the 80 chicks hatched and raised to maturity developed the disease. A limited number of the mature birds died of intercurrent diseases during the experiment; 20 chicks died as a result of pullorum disease, and a few died of coccidiosis. Fifty birds were held under observation for one year without any deaths occurring as a result of lymphocytoma.

Two groups of surviving first-generation hens were mated in the hope of getting resistant progeny. The first group consisted of nine Plymouth Rock hens mated with a Plymouth Rock cockerel. Only five hens of this group produced eggs. Seventy-eight chicks were hatched, of which 28 died when less than six months of age, 14 older birds died as a result of other causes, one was found to be affected with lymphocytoma, four with anemia and two with mixed leukosis. The second group contained eight Plymouth Rocks and one White Leghorn hen. Only the White Leghorn hen produced fertile eggs. Thirteen chicks were hatched. Of this number nine were raised beyond six months of age. None of these birds developed lymphocytoma.

#### TRANSMISSION EXPERIMENTS

During 1931, the following transmission experiment was conducted: Bird 1267, a Plymouth Rock hen and a progeny of 1941, died on April 1. All internal organs were neoplastic. Diagnosis: lymphocytoma. On March 17, 1931, this bird had a normal blood-picture. On April 1, just prior to death, the hemoglobin was 70 per cent (Tallqvist), total leucocytes 124,440 and total erythrocytes 4,180,000. Differential counts: lymphocytes 28 per cent, polymorphonuclears 0, eosinophils 71 per cent, and basophils 1 per cent. Cytological details: erythrocytes, normal; vacuoles in cytoplasm of large lymphocytes and budding of medium lymphocytes. The blood-picture did not correspond to the gross or histopathological findings. Bacteriological cultures remained sterile. Berkefeld N filtrates were prepared from a saline sus-

pension obtained from blood, liver and spleen of 1267. Three birds were injected intravenously each with 1 cc of the filtrate and three intra-abdominally each with 1 cc of the saline suspension. The disease was not transmitted to the recipients.

During 1932, the following transmission experiments were conducted: Bird 1282, a Plymouth Rock cockerel of unknown pedigree, died on Feb. 19, 1932. The liver, heart, spleen, kidneys and testicles were all enlarged. Diagnosis: lymphocytoma. On Feb. 10, 1932, 3 cc of blood was withdrawn as outlined before from the wing vein. One cc of this blood was injected into the wing vein of each of three birds. Again the disease was not transmissible.

Bird 1495, a Plymouth Rock pullet, died on March 18, 1932. All internal organs were neoplastic. Diagnosis: mixed leukosis. A saline suspension was prepared from the blood, liver and spleen. Ten cc of this unfiltered suspension was injected intra-abdominally into each of two birds. Berkefeld N filtrates were then prepared from the suspension and 2 cc was injected into the wing vein of two other birds. This type of disease was not transmissible in this instance.

During 1933, the following transmission experiment was conducted. Bird 1790, a Plymouth Rock cockerel of known pedigree, died January 9, 1933. Internal organs were all enlarged. Diagnosis: lymphocytoma. On the same date a saline suspension was prepared from the heart-blood, liver and spleen. This suspension was then filtered through cotton and gauze. One cc of this preparation was injected into the wing vein of each of four birds. Two of these birds died and both were found to be affected with lymphocytoma. One died 51 days and the other 75 days after the inoculation. Later on, it was learned that both of these birds originated from a flock in which other birds were found to be affected with this disease. These deaths may be explained as spontaneous cases.

#### CONTROLS

During the first two years of the experiment, approximately 25 birds were used as controls. These birds were not kept in isolation; rather they were allowed to mingle with the birds in the experiment until they were five to six months of age. An attempt was made to obtain birds from sources thought to be free from the disease. During the first year, none of the controls developed the disease; the second year, only one bird died as a result of lymphocytoma.

During the third year, 100 eggs were purchased from a valuable flock of White Leghorn birds. The parent stock had passed a negative whole-blood rapid agglutination test for pullorum disease. Another group of 75 eggs was purchased from Rhode Island Red birds. The parent stock of these chicks was not blood-tested. The flock history in each instance was negative as far as neoplastic diseases were concerned. The controls, after one month of age, were allowed to mingle with the birds in the experiment until they were five to six months of age. At that time they were separated and the controls were kept in pens adjacent to the other birds. Ninety-one White Leghorn chicks were hatched. A loss of 40 chicks occurred due to overheating. Fifty-seven Rhode Island Red chicks were hatched, 19 of these were lost on account of overheating at the same time as above. Eleven of the White Leghorns died after they were six months of age due to intercurrent diseases. One bird died as a result of mixed leukosis, two as a result of lymphocytoma and one as a result of fowl paralysis. Fourteen of the Rhode Island Reds died after they were six months of age due to other intercurrent diseases. None of these birds died as a result of lymphocytoma. The control birds were kept under observation for 14 months.

#### ORGAN AND TISSUE INVOLVEMENTS

A total of 79 birds was determined to be affected with lymphocytoma at the time of death. The lesions were recorded for the following organs: liver, heart, spleen, ovary, testicle, kidneys and nerves. The neoplastic tissue was distributed in the above birds as follows: liver 49, heart 29, spleen 27, ovary 7, testicle 4, kidneys 33, eye 0, and femoral nerve 1.

#### BLOOD EXAMINATION

Regular monthly blood examinations were made of all birds in the experiment including the controls. As stated before, these were begun when the birds were three to four months old. The examination consisted of making blood-smears stained with the Wright method. If pathological features were observed in any of the blood-cells, a complete blood examination would then be made.

Budding of lymphocytes appeared to be a rather common cytological detail. This feature cannot be considered of pathological significance in the bird. It has been observed in birds that appeared to be in perfect health. At no time did we find the blood-cells of any bird showing pathological features that would be an aid as a diagnostic agent of lymphocytoma.

## DISCUSSION

In these experiments only 64 hens produced fertile eggs. Record was not kept of the birds that produced all infertile eggs nor those that produced no eggs. A total of 735 chicks was hatched. Cockerels predominated slightly. Two hundred and forty-one (32.7 per cent) of the chicks died before they were six months old. One hundred and fifteen (15.6 per cent) of the birds died from intercurrent diseases after they were six months old. Seventy-nine birds (15.9 per cent) died as a result of lymphocytoma. Six months was taken as an arbitrary age after which lymphocytoma develops. The basis used in selecting this age was guided by the results obtained in this experiment and the records of the diagnosis laboratory where three to four thousand birds are autopsied annually. It is reasonable to suppose that some of the birds that died of other intercurrent diseases would have been susceptible during later life.

Attention is called to the susceptibility of the birds raised from several groups of parent stock: The Plymouth Rocks, first-gen-

TABLE I—Data on first-generation birds (1939).

PARENT BIRD	BREED	HATCHED	DIED LESS THAN SIX MONTHS	LYMPHO-CYTOMA	OTHER CAUSES
1938*	Plymouth Rock	6	3	2	0
1939		8	3	1	1
1940		4	1	1	1
1941†		4	0	3	1
1942		2	0	0	1
1943		2	0	0	2
Totals		26	7	7	6
1932	White Leghorn	3	3	0	0
1933		6	1	2	3
1935		2	0	0	2
1921*		3	0	1	1
1923		6	3	0	2
1928		4	0	1	2
1929		4	0	1	2
Totals		28	7	5	12

\*At death showed evidence of lymphocytoma.

†At death showed evidence of mixed leukosis.

*Comment:* Of the Plymouth Rocks that were raised beyond six months of age, 36.8 per cent showed evidence of lymphocytoma at the time of death. Of the White Leghorns that were raised beyond six months of age, 23.8 per cent showed evidence of lymphocytoma at the time of death.

eration birds that are included in the first part of tables I, II and IV, gave the following results: In 1930, 26 chicks were hatched and 36.8 per cent died as a result of lymphocytoma. During the year, one hen (1941) died as a result of mixed

TABLE II—Data on first-generation birds (1931).

PARENT BIRD	BREED	HATCHED	DIED LESS THAN SIX MONTHS	LYMPHO-CYTOMA	OTHER CAUSES
1938*	Plymouth Rock	8	5	1	0
1939		12	8	2	0
1940		15	7	2	0
1942		4	0	2	1
1943		20	3	8	1
Totals		59	23	15	2
1255*	Plymouth Rock	19	7	3	7
1256*		23	15	2	2
1257†		12	6	0	0
1262‡		2	1	1	0
1263‡		7	3	0	0
1964		8	4	1	1
1997		27	3	10	1
1999		8	3	1	0
Totals		116	42	18	11
1952	White Leghorn	6	2	0	0
1953		16	2	3	3
1955		37	10	2	1
1974‡		3	1	1	0
1976		25	8	2	0
Totals		87	23	8	4

\*At death showed evidence of lymphocytoma.

†Bird became a positive pullorum reactor.

‡At death showed evidence of mixed leukosis.

*Comment:* The Plymouth Rocks in the first part of table II are the same birds, with one exception, as those in the first part of table I. Of the Plymouth Rocks raised beyond six months of age from this group of birds, 41.6 per cent showed evidence of lymphocytoma. The second group of Plymouth Rocks was a new group of birds obtained from a flock in which numerous other birds were known to have died as a result of lymphocytoma. Of the birds raised beyond six months of age, 24.3 per cent showed evidence of lymphocytoma. The White Leghorns in this table have a similar history as the above Plymouth Rocks. Of the birds raised beyond six months of age, 12.5 per cent showed evidence of lymphocytoma.

There are two exceptionally interesting birds in table II—1943 and 1997. Neither of these two birds at death showed evidence of lymphocytoma. Fifty per cent of the progeny of bird 1943 that were raised beyond six months of age developed lymphocytoma. In the case of bird 1997, 43 per cent of the progeny developed the disease.

leukosis. Three of the four of her progeny showed evidence of lymphocytoma at the time of death. The following year (1931) the remaining five hens of this group produced 59 chicks and 41.6 per cent died as a result of lymphocytoma. The third year (1932), only three hens were living and they produced 59 chicks and only 2.5 per cent were affected with the disease. Bird 1943, in 1931, produced 17 birds, of which eight were affected with the disease, while the following year none of the five raised to maturity developed lymphocytoma. Bird 1943 was four years old and was not found affected with the disease at death. All of the Plymouth Rock adults in the second part of table II died during the years 1931 and 1932. Of this group, bird 1997 produced 24 birds, ten of which were affected with the disease, while the dam herself was free of the disease. In this experiment, other birds, not affected with lymphocytoma, produced progeny that developed the disease. The Plymouth Rocks in the first part of table III are second-generation birds derived from the first-generation birds in

TABLE III—Data on second-generation birds (1931).

PARENT BIRD	DAM OF PARENT	BREED	HATCHED	DIED LESS THAN SIX MONTHS	LYMPHO-CYTOMA	OTHER CAUSES
1977*	1938	Plymouth Rock	11	3	0	2
1966	1938		10	0	0	6
1991	1938		20	9	2	4
1560	1938		7	1	0	3
1986*	1941		6	1	3	2
1992	1941		10	5	1	3
1982†	1942		3	0	1	0
Totals			67	19	7	20
1394	1257	Plymouth Rock	1	0	0	0
1466†	1997		1	0	0	0
Totals			2	0	0	0
1263†	1933	White Leghorn	7	2	0	0
1984*	1935		8	4	0	0
1979	1923		8	0	1	3
1960	1928		8	0	1	3
Totals			31	6	2	6

\*At death showed evidence of lymphocytoma.

†At death showed evidence of mixed leukosis.

*Comment:* Of the second-generation Plymouth Rocks that were raised beyond six months of age, 14.5 per cent showed evidence of lymphocytoma at the time of death. Of the White Leghorns that were raised beyond six months of age, 8 per cent showed evidence of lymphocytoma at the time of death.

table I. Fourteen and five-tenths per cent of the second generation birds died as a result of the disease, while as a group 36.8 per cent of the parent stock were affected. The percentage of infection for the White Leghorns in the same tables was reduced from 23.8, as found in the parent stock, to 8 in their progeny or, in this instance, second-generation birds. In each instance second-generation birds were found to be less susceptible.

It was anticipated that more third-generation birds would be reared. However, we were unable to do so. The second-generation females either died or produced infertile eggs or no eggs at all. No explanation is offered with reference to the 50 birds raised

TABLE IV—Data on first-generation birds (1932).

PARENT BIRD	BREED	HATCHED	DIED LESS THAN SIX MONTHS	LYMPHO-CYTOMA	OTHER CAUSES
1939	Plymouth Rock	16	7	1	4
1940		29	6	0	11
1943		14	7	0	3
Totals		59	20	1	18
1657	Plymouth Rock	13	6	0	6
1662		6	3	0	3
1666		17	8	1	6
1669		9	3	0	2
1672		2	1	1	0
1675		14	4	3	4
1678		14	6	0	2
1693		13	5	2	4
Totals		88	36	7	27
1271*	White Leghorn	14	6	0	6
1276		18	7	0	6
1485*		3	2	0	0
1570*		7	4	0	3
1586		9	1	1	4
1636*		12	6	0	2
1641		12	6	1	1
Totals		75	32	2	22

\*At death showed evidence of lymphocytoma.

*Comment:* Only 2.5 per cent of the Plymouth Rocks in the first part of table IV, that were raised beyond six months of age, showed evidence of lymphocytoma at the time of death.

The second group of Plymouth Rocks in this table was a new lot of birds obtained from a flock in which other birds had died as a result of lymphocytoma. Of the birds raised from this group of hens, 13.4 per cent were found to be affected with lymphocytoma at the time of death; 4.6 per cent of the White Leghorns were found to be affected in a similar manner.

to maturity from the 100 eggs purchased from the White Leghorn flock in which 10 per cent losses had occurred during the previous season. None of them developed the disease while under observation. The possibility of a spontaneous outbreak suggests itself. The owner did not report further losses during the ensuing season.

The pullets (first-generation birds) that were mated for genetic reasons were the survivors selected from families where losses had been heavy as a result of the disease. The cockerel had the same history. Out of a total of 91 chicks hatched, 46 died from other causes and one as a result of lymphocytoma.

Transmission experiments gave negative results with the limited number of trials attempted.

The control birds were obtained in one instance from a large flock owned by a physician located near the laboratory. Up to the time that the chicks were obtained, no deaths due to lymphocytoma had occurred in this flock. Dead birds had been autopsied either by the owner or in the laboratory. During the season that the birds were used as controls, three birds in the original flock died of the disease. According to the results obtained, transmission did not occur under the conditions in which the experiment was conducted.

The organ and tissue involvement of the affected birds does not

TABLE V—Data on second-generation birds (1932).

PARENT BIRD	DAM OF PARENT	BREED	HATCHED	DIED LESS THAN SIX MONTHS	LYMPHO-CYTOMA	OTHER CAUSES
1394 1560	1257 1938	Plymouth Rock	1 7	0 2	0 0	0 0
Totals			8	2	0	0
1652 1584 1478 1376 1570 1545 1546	1952 1953 1953 1976 1953 1955 1955	White Leghorn	4 17 15 18 7 8 7	2 0 3 4 4 4 3	0 2 1 3 0 1 0	0 7 2 5 3 2 0
Totals			76	20	7	19

*Comment:* Of the White Leghorns raised beyond six months of age, 12.5 per cent were found to be affected with lymphocytoma at the time of death.

Only one hen (1517) produced any third-generation birds. Thirteen chicks were hatched, four of which died before they were six months of age. The remaining nine birds did not develop lymphocytoma.

agree with the findings of Johnson,<sup>6</sup> Biely and Palmer,<sup>9</sup> and Patterson *et al.*<sup>11</sup> The evidence suggests that the disease may be transmitted through the egg. This is in accord with Warrack and Dalling.<sup>7</sup> Not a single bird developed iritis. Only one bird developed paralytic symptoms. This bird was hatched in May, 1931. On December 4, 1931, the hemoglobin was 64 per cent (Dare), total leucocytes 78,880 and erythrocytes 1,970,000. *Differential count*: lymphocytes 48 per cent and eosinophils 52 per cent—an absolute eosinophilia. *Blood-smear examination*: extensive budding of medium lymphocytes, Auer bodies<sup>2</sup> and slight anochromasia. No interpretation of this smear is attempted as a result of examining only one blood-smear. The bird died a few days later. *Postmortem examination*: extreme emaciation, atrophy of kidneys; liver, spleen, heart and testicles, no gross lesions. Femoral nerves were yellowish and edematous. *Histologic examination*: Liver, extensive liver-cell destruction, a round-cell infiltration surrounding the portal vessels. Spleen, no lesions. Kidneys, a slight round-cell infiltration of the glomeruli, atrophy of the tubules and a slight round-cell intertubular infiltration. Testicles, no abnormal cell infiltration. Femoral nerves and spinal cord, an extensive round-cell infiltration as described by Pappenheimer<sup>1</sup> and others,<sup>3</sup> Doyle,<sup>4,5</sup> Johnson,<sup>6</sup> Biely and Palmer,<sup>9</sup> Patterson *et al.*<sup>11</sup> and Mathews and Walkey.<sup>12</sup>

The pathognomonic pathology was confined to the nervous system. There was some evidence of lymphocytoma and, had the bird lived longer, more evidence might have been found. There is no logical reason, in view of the prevalence of both diseases, why an individual could not be affected with both diseases. The essential pathology of fowl paralysis is found in the nervous system, as stated by Mathews and Walkey.<sup>12</sup> Feldman and Olson<sup>13</sup> "see no reason for confusing leukosis of chickens with a certain neuropathic disturbance which is referred to as 'fowl paralysis,' range paralysis, or *neurolymphomatosis gallinarum*, of which the principal lesion is a nerve infiltration with lymphocyte-like cells." Numerous other birds have been autopsied and found to be affected with fowl paralysis, the pathology being confined strictly to the nervous system. Other birds have been examined that had lesions of both diseases. The data do not indicate that the lesions of lymphocytoma and fowl paralysis are manifestations of a single disease.

#### SUMMARY AND CONCLUSIONS

1. A total of 735 chicks was hatched, of which 494 were raised beyond six months of age. Of this number, 15.9 per cent of the birds developed lymphocytoma.

2. The incidence of the disease was materially reduced in the second generation as compared to what occurred in the first-generation birds.
3. The disease was not transmissible by artificial inoculations.
4. The disease was not transmitted by contact.
5. Only one case of fowl paralysis developed.
6. No data were obtained to show that lymphocytoma and fowl paralysis are manifestations of a single disease.

#### ACKNOWLEDGMENT

The writer wishes to express his appreciation to Hazel Hamersland for much of the technical assistance in connection with the study.

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#### DISCUSSION

DR. R. E. REBRASSIER: Do you prefer heparin as an anticoagulant?  
 DR. FENSTERMACHER: I believe heparin has given us the best results. I think for this work heparin is the best.

Another thing, regarding the inoculation for transmission experiments, saline suspensions were prepared from the liver, spleen and heart-blood of birds showing lymphocytomatous organs. The tissues were ground in a sterile mortar, then filtered through two or three thicknesses of cotton gauze to remove the coarser particles. The inoculum was then injected intravenously, intramuscularly, or intraabdominally.

DR. H. J. STAFSETH: Two of your observations are very interesting. One is the apparent egg-transmission and the other is the disappearance of the disease in time. That is really borne out very well by field observations. A few years ago, one of the leading poultrymen in Michigan had a loss of approximately 50 per cent of all his birds for two years, after which the disease faded away and now it has disappeared almost completely.

Likewise a man in a neighboring state has made certain observations on some flocks of birds obtained from a state institution where paralysis was prevalent in the breeding stock. It was found that this disease spread like a fan through the flocks supplied with chicks from this institution. I think this adds support to your observations.

DR. E. E. JONES: We are doing no experimental work in the State laboratories in California. Diagnostic work is the only thing we do. However, we have observed in one lot of chicks, some delivered to one ranch and some to another, that fowl paralysis will develop on one ranch and not on the other. This indicates that some factor other than breeding is responsible for paralysis. Some poultrymen think that feeding has something to do with it. However, we find occasionally, even though the chicks are fed and cared for in the same manner, that one brood will develop the infection and the other will not. Our observations have been so misleading that from a field standpoint we are unable to make a guess as to what relation feeding, management and breeding might have.

DR. FENSTERMACHER: Of course, you can see from what I stated in my paper that I am not convinced that lymphocytoma is the same disease as fowl paralysis. I believe they are two entirely separate conditions. I know of no reason why both diseases could not occur concurrently in the same bird. We have projected an experiment in which our parent stock is from a flock in which both conditions are present. In this flock, the losses due to fowl paralysis and lymphocytoma have been heavy. Lesions of both diseases have been found in certain individuals.

DR. JONES: Do you find that in one flock many birds may be affected with blindness but not with paralysis; that another flock may have many paralyzed individuals but no blindness; and that another flock may have a large number of birds affected with tumors, with little or no paralysis or blindness?

DR. FENSTERMACHER: Well, you heard what I said in the paper regarding paralysis. We had only one bird develop it, and we had no blindness or eye disease in any of the birds. I do not know whether this experiment could be duplicated. Iritis may be present without paralysis. Then again, the reverse also is true. A large number of birds were used in this experiment. Fowl paralysis was rampant in a flock not more than 100 yards away, for one year, while we were studying lymphocytoma of the fowl, and no paralysis developed in our birds.

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### New York Broadcasting Program

The New York State Veterinary Medical Society announces the following programs to be heard on veterinary subjects over WGY (General Electric Station), from June 1 to July 13:

June 1—"Chickens—Beautiful but Numb (Leg and Wing Paralysis in Chickens)," Dr. E. L. Brunett, New York State Veterinary College, Ithaca.

June 15—"When Dobbin Gets Flat Tire (Lameness in the Horse)," Dr. E. J. Sullivan, Saratoga Springs.

June 29—"What to Do Till the Veterinarian Comes (First Aid to Farm Animals)," Dr. Arthur A. Brockett, Little Falls.

July 13—"Don't Spray Where Cattle Stray (Fruit and Vegetable Spraying and Its Relation to Poisoning of Farm Animals)," Prof. L. J. Cross, New York State College of Agriculture, Ithaca.

The time chosen for these broadcasts is 12:30 p. m., Eastern Standard Time.

## A HEMOPHILIC BACTERIUM AS A CAUSE OF INFECTIOUS CORYZA IN THE FOWL\*

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### Introduction

Upper respiratory infections in the domestic fowl present a number of clinical pictures with probably as many etiological agents involved. The malady known as contagious catarrh or infectious coryza is perhaps the mildest, but no doubt the most universally prevalent of the group, and although causing little direct economic loss is a troublesome and debilitating infection on the poultry farm. Its relation to the fowl in clinical manifestations, in environmental relationships, and in immunological reactions suggests strongly the similar condition in man, known as the common cold, and the knowledge of its etiology has been as obscure. Since this study was begun, however, two papers on the etiology of uncomplicated coryza in the fowl have come to our attention. De Bleeck,<sup>1</sup> in Holland, has reported a bacterium causing infectious coryza in fowl and, although his description is not complete, it seems likely that his hemoglobinophilic organism is identical with the one isolated in our study. Nelson,<sup>2</sup> in a preliminary report, describes the isolation of a coryza-producing agent from a filtrate which later was grown on the surface of blood agar. He denies that this organism is the same as that described by de Bleeck.

### Experimental

Following the demonstration by Lewis and Mueller<sup>3</sup> that the causative agent of the "common cold" in chickens was not a filtrable virus, a bacteriological investigation of the infectious material was undertaken. It had been found by the inoculation of healthy chickens six months old that the infectious agent was present in great dilution of unfiltered extracts of the exudate and tissue of the nasal passages, and that it remained active for a period of 24 hours and occasionally for 48 hours at 37°C, and for several days longer at ice-box temperature.

The bacteriological studies were developed in three stages: (1) First there was a preliminary investigation, in which the infec-

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tious material was streaked on plates directly or after several hours of incubation and the resulting colonies studied in pure culture. Both aerobic and anaerobic cultivations were carried out. This served as a survey of the bacterial flora of the nasopharyngeal passages of chickens suffering with infectious coryza. (2) The selection of a medium for optimum enrichment of the infectious agent then was undertaken. Survival and growth of the agent on various solid media also were tested. (3) Finally, the isolation and identification of a causative agent on blood-agar plates from the enriched cultures was successfully accomplished.

#### BACTERIAL FLORA OF THE NASAL SECRETIONS

Mucus from the infected upper nasal passages was either streaked directly on plates or extracted in physiological salt solution, in distilled water with hemolyzed blood or in chicken broth, and plated after a short period of incubation. It was soon found that direct plating of material from the upper nasal passages and sinuses often failed to yield cultures and that incubation of the extracts of nasal tissue in broth, even for a short period of two or three hours, tended to select organisms which had not appeared in numbers in the direct smears of the tissue. Extracts prepared in distilled water with blood seemed to give the most satisfactory results on plating after an hour or so at room temperature. Infusion agar, "chocolate" agar, five per cent whole rabbit-blood agar and infusion agar with hemolyzed chicken-blood were used for plates. Duplicate plates were inoculated in each experiment, one set to be incubated in ordinary atmosphere and one set under anaerobic conditions in a Varney jar, in which the oxygen was burned out with phosphorus.

The results in this preliminary study were essentially the same as those reported by other investigators of the nasal and tracheal secretions of the chicken in health and disease (Graham, Thorp and James,<sup>4</sup> Beach,<sup>5,6</sup> Gibbs,<sup>7</sup> Kernohan<sup>8</sup>). The bacteria commonly present on the mucous membranes of man and animals—certain staphylococci, streptococci and diphtheroids—were present in greater or less numbers according to the condition of the tissues. A number of rapidly growing organisms of the *Pseudomonas*, *Proteus* and *Coli-aerogenes* groups caused considerable difficulty by their overgrowth on culture media and were probably derived primarily from the feed. There were present also a number of ovoid bacteria, Gram-positive and Gram-negative, and several species of micrococci, none of which were identified, but which appeared rather constantly among the chickens studied. Particular interest was centered for a time on the *Pasteurella* strains

isolated. These were present in a number of chickens suffering with infectious coryza, although fowl cholera did not appear in the flock during the laboratory investigation. Another group of Gram-negative organisms which seemed to warrant special study was characterized by a pleomorphic rod-shaped morphology and growth only on blood agar, belonging therefore to the influenza group.

Many of the above organisms were facultative anaerobes and primary isolation was made from the anaerobic plates but in no instance was an obligate anaerobe fished.

Representative cultures of each type of bacterium isolated were tested on chickens by intranasal inoculation, using the same technic as had been followed in testing the extracts and filtrates (Lewis and Mueller<sup>3</sup>). In a similar experiment each of these pure cultures was mixed with a Berkefeld filtrate from a "cold" extract to test for a possible synergistic relationship between an organism and a filtrable virus or other substance. Only one group of organisms, the *Pasteurella*, gave encouraging results by producing a nasal catarrh in a certain number of inoculations with freshly isolated cultures. These rapidly lost virulence in transfer on laboratory media so that it was usually impossible to repeat results with any one strain. The attempts made at this time to produce "colds" with washings from blood-agar slant cultures of the influenza-like organisms were consistently negative. However, precautions were not taken to insure the viability of the cultures used, since the material obtained from the bacteriological laboratory usually was kept several days before chickens were available for tests. As is pointed out later, this delay probably accounts for the negative results and it is now believed these organisms were identical with those subsequently shown to be related to infectious coryza.

From these experiments it was concluded that none of the aerobic organisms isolated was the cause of infectious coryza in chickens. The occasional "colds" produced with the *Pasteurella* organisms suggested a possible relationship of these bacteria to the agent producing "colds." However, it was not possible to isolate the *Pasteurella* from all or even from a majority of the cases studied, and this argued against an etiological relationship. It is possible that these original isolations were mixed with the coryza-producing organism, which died out in subculture.

#### A MEDIUM FOR THE CULTIVATION OF THE INFECTIOUS AGENT

The next problem then appeared to be to discover whether the infectious agent could actually grow on any of the media we were

employing, or whether there was merely survival under the conditions of incubation. A medium which would support growth of the infectious agent in indefinite subcultures, and a method which would weed out most of the contaminating organisms therefore was sought and ultimately found.

The method employed was simple and direct. Scrapings from the upper nasal passages and sinuses were emulsified with hemolyzed-blood broth in definite proportions and a series of dilutions made from this. Plates were streaked from the original emulsion for aerobic and anaerobic incubation. Whole-blood agar and hemolyzed-blood agar were employed routinely. One-tenth of a cubic centimeter of each blood-broth dilution was inoculated into two series of tubes containing 2 cc of the enrichment medium under investigation. One series was incubated aerobically, the other anaerobically. In this way the following media were studied: hemolyzed-blood broth, pleural-fluid broth, Noguchi C (a semi-solid medium without blood) and Noguchi *Leptospira* medium (a serum-hemoglobin semi-solid medium). The overgrowth by *Proteus* or *Pseudomonas* organisms interfered in some of the earlier attempts but with improved technic in obtaining the mucous material from the upper nasal passages and sinuses of the chicks, satisfactory cultures were obtained. After incubation for 24 or 48 hours, each series of dilutions was tested on baby chicks, one to seven days old, by intranasal inoculation.

There are several points in the technic for inoculating the chicks and reading the results that might be emphasized at this time. Chicks nearing seven days of age gave most satisfactory results, probably because the nasal passages were easier to inoculate, and because the openings into the sinuses were then patent, which was not always true in day-old birds. Moreover, by the use of chicks which never had been in contact with adult carriers we were able to produce an uncomplicated picture in our infection tests and to eliminate the chance of a carrier condition, of a refractive state or of other respiratory diseases which were of course always possible complications in the adult fowl. Inoculation was performed by instilling a small amount of the fluid to be tested into the nasal openings. Inoculations through the cleft palate gave less consistent results and there was always a possibility of injury to the tissues by trauma in that method.

All food and water was removed from the cages at night and readings for the presence or absence of "colds" were made in the morning before feeding. This is an important precaution in eliminating the complicating factor of moisture from the drinking water in the nasal passages. The plug of mucus, if present

in the external nares, was removed with sterile forceps and the nostril gently compressed to expel any secretion. Under these conditions the difference between the dry nose of the healthy chicken and the watery or mucoid secretion present in the sick chick was perfectly clear cut. Examinations were made daily and the uninfected chicks transferred to clean sterile cages. As soon as a cold was discovered, the infected chick was removed from the laboratory. At the conclusion of an experiment, all cages, tables and brooder apparatus were sterilized carefully and all experiment chicks taken out of the laboratory before bringing in a new lot. Isolation of test groups was accomplished by wrapping the cages in paper and keeping them separated. Some uninoculated chicks or those receiving sterile media only were kept in every cage during each test as controls. In this way it was shown that during the course of the experiment contagion never passed from cage to cage and that in natural transmission from chick to chick in the same cage, symptoms appeared in the control chicks in not less than five days, and usually not before seven to ten days. Some chicks failed to acquire the infection even on prolonged contact with infected birds.

Of the media studied, the one which brought about the greatest number of "colds" was found to be the Noguchi *Leptospira* medium (Noguchi and Lindenberg<sup>9</sup>), hereafter designated as "semi-solid." It had the following composition:

*Noguchi Leptospira Medium*

Sodium chlorid (0.9%)	800 parts
Fresh rabbit-serum	100 parts
Nutrient agar 2% (pH 7.4)	100 parts
Rabbit hemoglobin	10 to 20 parts
(Prepared from 1 part defibrinated blood and 3 parts distilled water)	

A typical protocol is reproduced in table I. In this experiment, as in several of the other early experiments, only one chick was used for each test. Later, two to four chicks were employed regularly to test each culture. In this way the factors of possible differences in host susceptibility and unavoidable variations in technical manipulation largely were eliminated. After several subcultures, some of the greater dilutions produced "colds" more promptly and regularly, as shown in table II. The stock "cold culture" obtained from the 1:2,000,000 dilution of a 24-hour chicken cold was still virulent after more than 40 transfers. As either aerobic or anaerobic incubation appeared to favor the growth of the infectious agent in the semi-solid medium, the anaerobic cultivation subsequently was discontinued. Blood-agar

plates were streaked from the cultures which produced colds, and tests were made for the presence of the agent on these plates by inoculating chicks with washings from portions of them. Washings from the streak plates of the original extract also were tested. By this means it could be shown that the infectious agent was sometimes present on the blood plates after 48 hours of either aerobic or anaerobic incubation.

It was soon found that frequent transfer of the "cold culture" was required to maintain its virulence in the semi-solid medium. The protocol for the experiment to demonstrate this point is reproduced in table III. There was a marked loss of virulence in five to seven days, with a consequent lengthening of the incubation period in the chick. Optimum growth seemed to occur between 24 and 72 hours. Very minute amounts of the cultivated infectious agent produced a "cold" after a prolonged incubation period. The subculture represented as "0" incubation time in

TABLE I—*Dilutions of chicken cold 3-18. Cultures (48 hours) tested on week-old chicks.*

DILUTION OF INFECTIOUS MATERIAL	SEMI-SOLID MEDIUM		BROTH WITH HEMOLYZED BLOOD	
	AEROBIC	ANAEROBIC	AEROBIC	ANAEROBIC
1: 2,000	+	+	+	0
1: 100,000	+	+	0	0
1:2,000,000	0	+	+	0

+ = Chick developed cold within two days.

0 = Chick failed to develop cold.

Each mark represents result on one chick.

TABLE II—*Chicken cold 3-18. Third subculture (48 hours) tested on week-old chicks.*

ORIGINAL DILUTION	SEMI-SOLID MEDIUM	
	AEROBIC	ANAEROBIC
1: 2,000	+ 0	+ d
1: 20,000	++	++
1: 100,000	0 0	++
1: 200,000	+ d	+ 0
1:2,000,000	++	++

+ = Chick developed cold within three days.

0 = Chick failed to develop cold.

d = Died before examination.

Each mark represents result on one chick.

table III contained one loopful of a 48-hour culture in 2 cc of medium, a dilution of at least 1 to 1,000.

It was now possible to maintain on laboratory media an infectious agent producing coryza of the chicken and to reproduce the clinical picture in the chick by intranasal inoculation at any time. In repeating this procedure to obtain a new culture from an individual having a cold, the greatest dilution of the nasal tissue extract showing bacterial growth in the semi-solid medium was found to be the most satisfactory for the demonstration of the infectious agent. Lesser dilutions usually contained a larger variety of contaminating organisms which tended to overgrow the culture, and greater dilutions, in which growth could be demonstrated neither microscopically nor macroscopically, proved very irregular and generally negative in the production of clinical symptoms. In no case were subcultures from these high dilutions positive. This suggested that the infectious agent probably either grew in a symbiotic relationship with another organism or that the semi-solid medium being used was not able to support its growth in pure culture, or that the true interpretation was a combination of these factors. It was found subsequently that this last hypothesis probably offered the real explanation for the results as obtained in these experiments.

TABLE III—*Effect of incubation on virulence of three strains of the agent of infectious coryza in mixed cultures.*

CULTURE	INCUBATION TIME OF CULTURE (DAYS)	INCUBATION TIME FOR COLD IN INOCULATED CHICKS (DAYS)						
		1	2	3	4	5	6	7
107	0	0000	0000	0000	0000	000d	000	++d
	1	0000	++d0	++0	++0	++0	++0	++0
	3	+00	+00	+00	+++			
	7	0000	++00	++00	++00	++00	++00	++00
108	0	0000	0000	0000	+000	+++0	+++0	+++0
	1	+++0	++++					
	3	+00	+00	+00	+++			
	7	0000	0000	0000	0000	0000	0000	0000
109	0	0000	0000	0000	+000	+++0	+++0	+++0
	1	++++						
	3	+00	+++	+++				
	7	0000	+000	++00	++00	++00	++00	++00

+ = Chick developed cold.

0 = Chick failed to develop cold.

d = Chick died before examination.

Each mark represents result on one chick.

THE ISOLATION IN PURE CULTURE OF A CAUSATIVE AGENT OF  
INFECTIOUS CORYZA IN THE FOWL

The demonstration that washings from blood-agar plate cultures might at times produce clinical symptoms in inoculated chicks encouraged further attempts in the isolation of the infectious agent in pure culture from these plates. Colonies were fished to the semi-solid medium or to blood-agar slants. A few of the semi-solid subcultures produced coryza in the chick, and it was discovered that in each of these cases there was a mixed culture of a large vacuolated, Gram-variable rod and a small Gram-negative rod. By repeated plating, it was possible to obtain the large vacuolated rod in pure culture in the semi-solid medium and to show that it was entirely non-virulent for chicks. The small Gram-negative rod failed to grow in pure culture in the semi-solid medium but grew in pure culture on the surface

TABLE IV—*Pure cultures of Hemophilus gallinarum tested on week-old chicks.*

CULTURE	TESTED	MEDIUM FOR GROWTH	INCUBATION TIME FOR COLD IN INOCULATED CHICKS (DAYS)			
			1	2	3	4
120 (6)	5-12	Blood slant	++0	+++		
128 (4)		Blood slant	+00	++0		
129 (13)		Blood slant	000	000	+++	+++
130 (11)		Blood slant	+00	+++		
120 (6)	5-16	Blood slant	+00	+++		
125 (4)		Blood slant	+00	++0	+++	
130 (11)		Blood slant	000	+00	++0	+++
120 (6)	5-20	S-S	000	000	+00	+++
120 (6)		S-S with vacuolated bacterium	+00	+++		
120 (6)	5-25	Blood slant	+00	++0	++0	++0
120 (6)		S-S	++0	++0	++0	++0
120 (6)		S-S with blood	+++			
120 (6)		S-S with blood	+++			
120 (6)		S-S with tissue and hemoglobin	++0	++0	+++	
183	6-9	S-S with blood	+++			
184		Blood slant	+00	++0	+++	
120 (6)		Blood slant	++0	++0	++0	++0
189	6-13	Blood slant	+++			

+ = Chick developed cold.

0 = Chick failed to develop cold.

S-S = Semi-solid Noguchi medium.

Each mark represents result on one chick.

of a blood-agar slant or plate. On intranasal inoculation in chicks, viable cultures of this small Gram-negative bacterium regularly produced the typical clinical picture of infectious coryza in chickens. As shown in table IV, only three of 54 inoculations (approximately 5 per cent) failed to produce coryza in the chick within four days. It could be recovered from the sick chicks in pure culture by direct plating of the mucus or by dilution in semi-solid media as described in the previous section. This recovered organism again produced coryza in inoculated chicks. Passage through chicks or passage in tissue cultures for 24 hours appeared to enhance the virulence of the stock strain on several occasions.

*Description of cultures:* The organism is a small, Gram-negative, non-motile bacillus. In mixed culture with the vacuolated bacterium and in cultures with living tissue cells it appears as a small, rather regular organism, with a tendency for diploid arrangement, and in short chains. Some forms are distinctly coccoid. In pure cultures on blood-agar slants there is a tendency for thread formation during the first 48 hours and later for the production of bizarre and highly pleomorphic elements that stain irregularly or poorly. A partial atmosphere of carbon dioxid produces a marked stimulation of growth and a more regular morphology in young cultures. In a normal atmosphere at 37° C, maximum growth seems to have occurred at about 48 hours but under carbon dioxid there is optimum growth within the first 24 hours. The organism is also a facultative anaerobe growing in the entire absence of oxygen.

The colonies on 5 per cent blood agar are tiny, smooth, translucent, becoming larger and somewhat more opaque with age, with thin peripheries and slightly granular and conical centers. There is usually better growth in the vicinity of contaminating colonies. In pure culture in media without whole blood there may be survival for a time but little or no growth. This may explain the occasional "cold" produced with inoculations of high dilutions of infectious material in which no bacteria could be demonstrated microscopically. Hemoglobin and tissue extract will support growth to a limited extent but degeneration begins to occur within the first 24 hours. In this respect the organism differs from *Hemophilus influenzae* of man for which the required growth factors can be supplied by extracts of tissue and hemoglobin in the absence of whole blood. The fowl organism multiplies rapidly, however, in the presence of living chick tissue without blood, and shows a remarkable uniformity of morphology.

When the tissue dies or is killed, growth of the organism ceases and its viability is soon lost.

The abundant growth on chick-embryo cultures in either plasma or Locke-Lewis solution may be subcultured after incubation for 24 hours but at 48 hours subcultures are almost invariably sterile. "Tissue cultures" in flasks, in which the pieces of tissue survive for a time but do not continue to grow, may support a limited growth of the organism upon or immediately surrounding the tissue. Certain aerobic bacteria also are capable of stimulating or supporting growth in media such as the semi-solid which is not in itself adequate for the growth of the "cold" organism. The vacuolated bacterium already mentioned is the most efficient organism tried, although a staphylococcus strain isolated from a human source and certain spore-formers have been found effective. The freshly killed cultures of the vacuolated bacterium also will stimulate growth when added to the semi-solid medium. This semi-solid medium is rendered most suitable for the growth of the fowl hemophilic organism, however, by the addition of one-tenth per cent or more of fresh whole blood, or the presence of living growing cells. Survival on this medium is between five and seven days as a rule. On blood-agar slants the organism may remain viable for a few days longer.

In hemopeptone water with and without nitrate there is no visible growth but the reduction of nitrates to nitrites by some of the strains can be demonstrated. Indol is not produced in this medium. There is a slight hemolysis of red blood cells in semi-solid media. Due to insufficient growth in the appropriate media the carbohydrate fermentations have not yet been tested. There is, however, definite acid production from dextrose when the organism is grown in Locke-Lewis tissue cultures in which the hydrogen-ion concentration is reduced from about pH 7.2 to pH 6.4 by the bacterium.

The organism has a very low resistance to heat. When suspended in distilled water at 45° C for six minutes and subcultured on blood agar no growth occurs. The culture remains viable in distilled water at room temperature, however, for at least an hour. At 50° C in distilled water death takes place in less than two minutes. Suspended in hemolyzed-blood broth it is killed at 55° in between four and six minutes. In this menstruum the organism survives at 50° C for at least ten minutes. This low heat resistance may account in some measure for the absence of infectious coryza epizootics among chickens during the summer months.

Because of its growth requirements, its morphology and its habitat, this bacterium should probably be classified with the other hemophilic organisms in the genus *Hemophilus*. Because it is isolated from the chicken and its etiological relationship to at least certain cases of infectious coryza in the chicken has been demonstrated, the specific name *gallinarum* is proposed. A similar and possibly identical organism has been described by de Blieck<sup>1</sup> as *Bacillus haemoglobinophilus coryza gallinarum*. The name *Hemophilus gallinarum* is herewith submitted with the recommendation that it is fully as descriptive as de Blieck's and in addition that it meets the requirements of our bacteriological system of binomial nomenclature.

#### CONCLUSIONS

1. A pleomorphic, hemophilic, Gram-negative bacterium has been isolated from uncomplicated infectious coryza of the chicken, for which the name *Hemophilus gallinarum* is proposed.
2. Pure cultures of this organism regularly produce coryza in the chicken when inoculated intranasally. The bacterium can be re-isolated from the infected bird and will again produce the typical clinical picture on inoculation in healthy non-carrier stock.

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#### New York State Veterinary Medical Society

An interesting two-day program for the meeting of the New York State Veterinary Medical Society, to be held at the Hotel Seneca, in Rochester, June 28-29, 1934, is promised by the Local Chairman, Dr. Frank L. Stein, of Rochester.

Mastitis and its relation to the milk supply and dairy inspection will be discussed thoroughly the first day. On the second day, the members will be entertained at the Strong Memorial Hospital and Research Laboratories. The program will consist of papers by members of the staff, motion pictures and a demonstration of the pregnancy test of mares recently completed. A pathology congress, that will be new and of great interest to veterinarians, also will be held.

# THE USE OF DIFFERENT CONCENTRATIONS OF TUBERCULIN IN THE DIAGNOSIS OF TUBER- CULOSIS OF CHICKENS\*

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In making the intradermic tuberculin test described by Van Es and Schalk<sup>1</sup> for the detection of tuberculous infection in chickens, one is impressed by the relatively large amount of tuberculin used. For the purpose of determining if the injection into tuberculous chickens of minute amounts of tuberculin would be followed by reactions of diagnostic significance, the observations which follow were made.

## ANIMALS USED

Arrangements were made to secure from the owners of two flocks of chickens those which had reacted to the tuberculin test made by veterinarians cooperating with the state and federal authorities in making a survey of the extent of tuberculosis among chickens in certain districts of Minnesota.

Nineteen Barred Rock hens were tested. Six hens were obtained from one flock and thirteen from another, and all were between one and three years of age. The respective flocks from which the chickens were obtained had been maintained for many years, and the owners reported a considerable annual loss from what was presumably tuberculosis. On the basis of the positive reactions obtained the incidence of infection in the two flocks was 30 and 50 per cent respectively.

Most of the 19 chickens were in fair flesh; some were actually fat. None of them appeared sick. They were purchased for the experiment within a few days after the results of the diagnostic tuberculin test were recorded.

## METHODS

The chickens were placed in concrete cages equipped with raised, wire-grate floors; each cage accommodated three or four. Cages were cleaned daily except Sunday and the droppings were never permitted to accumulate on the floors. Food and water were supplied in receptacles suspended from the cage door, high enough to preclude fecal contamination.

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Thirty days were permitted to elapse before the experimental administration of tuberculin was begun, and the subsequent injections usually were given at intervals of four to six weeks. After a total of five test periods, the chickens still living were killed for necropsy.

Necropsy was performed on each of the 19 chickens and the gross pathologic anatomy noted. Portions of the liver, lung, spleen, bone-marrow and brain were preserved for subsequent study of the pathologic histology. The diagnosis of all lesions subsequently designated as tuberculous was based on finding acid-fast bacillary forms within histologically typical tuberculous tissue, and not on gross morphologic alterations. Tissues from chickens in which gross evidence of tuberculosis was not evident were examined carefully for microscopic lesions.

#### TUBERCULIN

Two concentrations of tuberculin were used. One was a standard avian tuberculin containing the usual 50 per cent concentration of old tuberculin. The other was prepared from old tuberculin produced from *Mycobacterium tuberculosis* (avian) by the same manufacturer of biologic reagents responsible for the preparation of the standard avian tuberculin first mentioned. Thus the tuberculins used were of similar origin and differed only in the concentration of the active principle.

The diluted product used in the subsequent injections was prepared as follows: Old tuberculin, 0.1 cc, was added to physiologic sodium chlorid solution, 9.9 cc. The amount of the diluted fluid used intradermally was the same as the dosage of regular tuberculin injected, that is, approximately 0.03 to 0.05 cc.

In order to insure a product of consistent potency, the diluted solutions of tuberculin were prepared fresh every four or five weeks.

#### THE TESTS

Although occasionally a chicken was given an injection of only one concentration of tuberculin, in the majority of instances both concentrations were administered simultaneously, the wattles being utilized for the injections. Results of the tests were recorded 48 hours subsequent to the injection.

#### RESULTS

A summary of the results obtained following the injection into the respective chickens with the two concentrations of tuberculin is given in tables I and II.

It may be noted that two of the eight chickens that harbored a definite tuberculous infection at the time of necropsy failed to react positively to either concentration of the tuberculin, although the tests were made repeatedly (table I). One of the chickens was under observation for 285 days before it was killed, and the other died 101 days after the experiment began. In both chickens definite lesions of tuberculosis were found at necropsy.

It was unusual for the reaction elicited by the diluted tuberculin to be of the same magnitude as that induced by the more concentrated or regular tuberculin. As a rule, the reactions induced by the diluted product were much milder than those observed when tuberculin of standard strength was injected. As the magnitude of the reaction elicited by the regular tuberculin diminished in successive tests, so did the intensity of the reactions incited by the more dilute product decrease until a +1 positive reaction following the injection of the regular tuberculin was usually associated with a negative reaction in the wattle injected with the tuberculin of lesser concentration.

Neither of the concentrations of tuberculin caused strengthening or increase in the magnitude of the reaction as subsequent tests were made. In fact, the reactions, for the most part, diminished in intensity as the observations were prolonged, and it

TABLE I—Results obtained following the injection of tuberculin in different concentrations in chickens found to be tuberculous at necropsy.\*

CHICKEN	TUBERCULIN TESTS†										DAYS UNDER OBSER- VATION	DISTRIBUTION OF THE LESIONS OF TUBERCULOSIS
	1		2		3		4		5			
	R	D	R	D	R	D	R	D	R	D		
8	0	+2	0	+1	+4	+2	+4	0	+1	0	151	Liver, spleen, lung, bone-marrow
9	+2	0	—	0	—	—	—	0	—	—	186	Generalized
10	—	0	0	—	—	—	—	—	—	—	285	Spleen
11	‡	0	0	—	—	—	0	0	0	0	101	Liver, spleen
12	+4	—	0	—	+1	+1	+1	—	—	—	189	Liver, spleen
15	0	+3	+4	+1	+2	+2	+2	+1	+2	+1	269	Liver, spleen
16	0	+1	+1	—	+1	—	0	0	0	0	111	Spleen
18	0	+3	+2	+1	+2	—	+1	—	—	—	269	Spleen

\*Positive reactions to tuberculin are recorded on the basis of +1, +2, +3 and +4, depending on the degree and character of the local tissue reaction. +1 indicates a reaction of the smallest magnitude; +4, of the greatest. Minus indicates a negative reaction whereas zero indicates data are not available.

†The letters R and D indicate the concentration of tuberculin used: "R" the standard or regular tuberculin (old tuberculin 50 per cent), and "D" the greatly diluted product (each cubic centimeter of the fluid used for injection contained 0.01 mg of old tuberculin).

‡Observations made six hours after injection of tuberculin showed the reaction to be positive +2. The reaction had disappeared at the 22nd hour.

was not unusual to obtain negative results during the latter part of the observation period.

There was no particular merit or apparent advantage in the use of the greatly diluted tuberculin over the standard or regular product in eliciting reactions of clinical significance.

Data concerning the eleven of the 19 chickens (table II) are of particular interest because of the fact that in none could a tuberculous infection be demonstrated either grossly or microscopically. This seems curious, since all of the chickens were originally considered tuberculous on the basis of a positive diagnostic tuberculin test and were purchased for the experiment. Again, as may be observed in table II, the reactions induced in many of the chickens by tuberculin of standard concentration were not inferior to many of those recorded in table I, in the chickens that eventually were proved to be tuberculous. In fact, the results of the tuberculin tests of the chickens recorded in table II would appear as significant in the diagnosis of tuberculous infection as those recorded in table I. On the basis of the character of the allergic reaction, there are no distinctive differences between the tuberculous and the nontuberculous chickens.

#### SUPPLEMENTARY OBSERVATIONS

In order to obtain information on the value of the diluted tuberculin under the practical demands of diagnosing tuberculosis

TABLE II—Results obtained following the injection of tuberculin in different concentrations in chickens which were without demonstrable evidence of a tuberculous infection.\*

CHICKEN	NUMBER OF TUBERCULIN TESTS										DAYS CHICKENS OBSERVED	COM- MENT
	REGULAR (O. T. 50 PER CENT)					DILUTED (0.01 MG O. T. IN EACH CC)						
	1	2	3	4	5	1	2	3	4	5		
1	+2	—	0	0	—	—	—	—	—	—	165	Killed
2	+3	+1	0	0	+2	+1	+1	+1	+2	+1†	285	Killed
3	+4	—	—	—	—	+1	—	—	+1	—	285	Killed
4	+1	—	—	—	—	—	—	—	—	0	165	Killed
5	+1	+3	+3	+1	—	+1	—	—	—	0	165	Killed
6	+1	+4	+4	—	—	+1	—	—	+1	0	185	Died
7	—	+4	+4	+2	—	+2	+3	—	—	0	165	Killed
13	—	—	0	0	—	—	—	—	—	0	285	Killed
14	+1	+1	+1	—	—	+1	—	—	—	0	160	Died
17	+4	+1	0	0	0	—	+1	0	0	0	96	Died
19	+3	—	0	0	—	+2	—	0	0	0	109	Died

\*Positive reactions to tuberculin are recorded on the basis of +1, +2, +3 and +4, depending on the degree and character of the local tissue reaction. +1 indicates a reaction of the smallest magnitude; +4, of the greatest. Minus indicates a negative reaction whereas zero indicates data were not available.

†The fifth test was done 81 days after the fourth, and the dilution of tuberculin used in administering the fifth test was 10 per cent (old tuberculin, 0.1 gm; physiologic sodium chlorid solution, 0.9 cc).

among spontaneously infected flocks, the coöperation of Dr. S. H. Burgess, of the U. S. Bureau of Animal Industry, and of Dr. J. V. Ramler,\* of the Minnesota State Live Stock Sanitary Board, was secured. These men were engaged in a preliminary survey of the incidence of tuberculosis in chickens among Minnesota farm flocks. Each was supplied with a quantity of the greatly diluted tuberculin, which was injected into chickens simultaneously with the regular tuberculin of 50 per cent concentration. The reactions were recorded after 48 hours.

Data were obtained on 266 chickens. In this group positive reactions were obtained in 60 birds (approximately 23 per cent). All of the 60 birds reacted positively to the regular tuberculin, but in only 36 of these was a positive reaction elicited by the diluted tuberculin. In no instance was a positive reaction obtained by the injection of the less concentrated product when similar results were not induced in the same animals by tuberculin of standard concentration.

#### COMMENT

These observations indicate that the dosage of tuberculin suggested by Van Es and Schalk for making the intradermic test in chickens is perhaps optimal. Although the amount of tuberculin used seems tremendously large in comparison with the dose of tuberculin used in the intradermic test for tuberculosis of cattle and the Mantoux test for tuberculosis of human beings, there are no evident disadvantages in using the larger dosage. Tuberculosis in chickens is usually characterized by multiple lesions that contain the etiologic bacteria in excessive numbers, and this factor may well have some influence on the magnitude of the local reaction elicited by injection of tuberculin. It is clearly apparent that avian tuberculin, when diluted to the concentration suitable for conducting the Mantoux test on human beings, is of questionable efficacy in the diagnosis of spontaneous tuberculous infection of chickens. Whether less dilute concentrations would be more satisfactory is problematic.

All of the eleven chickens which failed to reveal lesions of tuberculosis when examined at necropsy reacted positively to the initial or diagnostic test. In the majority of instances the reactions elicited in the subsequent tests were not inferior to those recorded for the eight chickens in which lesions of tuberculosis were demonstrated eventually (table II).

Chickens which react in a characteristic manner to the tuberculin test and yet fail to disclose demonstrable evidence of in-

\*Deceased, December 6, 1933.

fection constitute a problem that is basically not unlike that presented by the so-called no-lesion reactors, encountered in making the tuberculin test in cattle.

#### SUMMARY AND CONCLUSIONS

Under natural and experimental conditions, a series of hens aged from one to three years were given injections simultaneously with tuberculin of the usual (50 per cent) concentration and a greatly diluted product containing 0.01 mg of old tuberculin in each 0.1 cc of injection fluid. All injections were intradermal. The positive reactions elicited by the less concentrated tuberculin were rather consistently inferior to those provoked by the tuberculin of standard (50 per cent) strength. Also many more positive reactions were obtained by the use of the more concentrated tuberculin than were secured by the weaker product. The results seem to justify the following conclusions:

1. Tuberculin of standard concentration (50 per cent) is of greater reliability in the diagnosis of avian tuberculosis than a product in which the active principle has been diluted to a concentration comparable to that suitable for the Mantoux test for human beings.

2. The nature, pathogenesis, and the subsequent course of tuberculosis of fowls probably differs sufficiently from that of mammals to require a tuberculin of greater potency for diagnostic purposes.

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#### Professions Exchange Views

Veterinarians were featured prominently on the program of the Washington County Inter-Professional Medical Society, which met in Brighton, Iowa, April 26, 1934. The theme of the program was the relation of the veterinary profession to the other medical professions. Those taking part were: Dr. E. A. Horner (McK. '19), of Brighton, who presided during the evening session; Dr. John B. Bryant (Colo. '14), of Mount Vernon, who gave a talk; Dr. R. M. Hofferd (Chi. '17), of Cedar Rapids, who discussed "Veterinary Services Safeguarding Public Health." Sixty-two nurses, druggists, physicians and veterinarians attended the meeting.

## SWINE ERYSIPELAS AND ITS ECONOMIC IMPORTANCE\*

By GEO. W. STILES and C. L. DAVIS

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Recently there have appeared a number of articles establishing the existence of swine erysipelas in certain parts of the United States. Its possible occurrence in other regions of our country has yet to be confirmed. Europe has recognized the presence of this disease for more than 50 years. Since the causative organism (*Erysipelothrix rhusiopathiae*) was discovered in 1885 by Löffler and Schutz, many workers, both in continental Europe and in America, have made contributions pertaining to this subject.

The earliest available record of supposedly swine erysipelas in the locality of the Denver Pathological Laboratory was reported by Newsom,<sup>1</sup> May, 1918, in a pig received from a ranch near Cheyenne Wells, Cheyenne County, Colo. Three cases of sloughing skin were noted in this herd. The cause of the condition was not determined, but the disease was called "scleroderma in hogs." In a recent interview, Dr. Newsom is quite certain that this case was swine erysipelas in the chronic stage.

The first definite diagnosis of swine erysipelas in the United States was made in 1920, by Creech,<sup>2</sup> of the Pathological Division, Bureau of Animal Industry, U. S. Department of Agriculture, at which time the causative agent was isolated from urticarial lesions or diamond skin disease of swine. Specimens came from widely separated regions. Two years later, A. Ward<sup>3</sup> studied 22 sets of pig specimens showing polyarthrititis, from which he isolated the erysipelas organism in a number of instances. These specimens had their origin in various sections of the country. The lesions noted corresponded to those found in many of the hog-killing establishments of the United States. He concludes by saying:

The facts warrant the suspicion that the acute, highly fatal type of swine erysipelas may exist in this country so far unrecognized.

In the same year (1922), Giltner<sup>4</sup> studied an outbreak of swine erysipelas in young pigs which closely resembled the acute type. In the past year, other investigators in swine diseases have recorded the presence of swine erysipelas in many sections of this country, manifesting itself in its various forms, including the acute, chronic arthrititis, as well as the skin-lesion type.

\*Received for publication, October 11, 1933.

There is evidence that the swine erysipelas organism is widely disseminated, and since its presence is reported in man, especially among persons working in public abattoirs, this organism becomes of importance in relation to public health. It has been found in cattle, sheep and birds.

#### OCCURRENCE OF THE DISEASE

The basis of this article comprises 210 positive cases of swine erysipelas which have come to the Denver laboratory during the last twelve months. Of the total number of specimens received, 153 came through the Denver federally inspected establishments. From this number, twelve specimens were traceable to their origin; records for the remaining 141 were not available, having been slaughtered as "mixed lots." Forty-seven specimens originated in Colorado, in the following counties: Adams, Denver, Elbert, Kit Carson, Larimer, Logan, Rio Grande, Sedgwick, Washington and Weld. Nineteen cases originated in Nebraska.\* A single case came from each of the states of New Mexico and Wyoming, traced through the Denver yards. According to available data, swine erysipelas has been definitely diagnosed in Alabama, Colorado, Idaho,† Iowa, Illinois, Indiana, Kansas, Missouri, Nebraska, New Mexico, New York, Ohio, Oklahoma, South Dakota, Texas, Virginia and Wyoming.

#### ARTHRITIS IN SWINE (DENVER YARDS)

According to records obtained by Dr. J. E. Shelton, during five months at the federally inspected establishments, Denver, the data in table I are available.

#### FIELD INVESTIGATION

Inspection reports from 13 farms in Colorado visited by members of the Bureau force showed a total number of 709 swine on these farms. Of this number, 200 apparently had died of acute swine erysipelas, and 131 hogs showed chronic arthritis. Hog cholera has not been known to exist on any of these farms during this investigation, covering the period from April to September, 1932. Subsequent visits to some of these farms revealed additional cases which developed following the first inspections. They are not included in the foregoing figures. On practically all the farms visited, there were losses due to the acute or septicemic type. Recovered cases in many instances developed either arthritis or sloughing skin.

\*Dr. J. E. Peterman, U. S. B. A. I. Nebraska field force, submitted 17 positive specimens of blood.

†Dr. W. C. Nye, U. S. B. A. I. Idaho field force, sent five positive specimens.

## EPIZOOLOGICAL OBSERVATIONS

In some instances, acute outbreaks of swine erysipelas appeared to follow heavy rainstorms. Some farms are widely separated and evidences of direct contact or communication was lacking. Water supplies, streams, wallows or irrigation ditches were not used in common. In this part of the country, however, there are flocks of blackbirds, sparrows, pigeons and magpies. There is some evidence that moles, rats, mice and other rodents were implicated in the spread of swine erysipelas. All of these frequent feeding-troughs and corrals where swine are confined. In a few cases the herd boar was used by neighbors. Introduction of swine from infected localities to non-infected areas should be considered as one method of spreading this disease. The improper disposal of dead animals constitutes a menace to the swine industry. Two farmers partially cremated a few hogs dead of erysipelas. The charred carcasses were fed to the remainder of their herds, with the result that an outbreak of erysipelas occurred a few days afterward on both premises.

TABLE I—*Arthritis in swine at Denver packing-plants.*

PERIOD	HOGS			RESULTS OF TEST			
	SLAUGHTERED	RETAINED FOR ARTHRITIS	TESTED	SEROLOGICAL		BACTERIOLOGICAL	
				POS.	NEG.	POS.	NEG.
Oct. 1932	22,382	99	9	9	0	4	5
Nov. 1932	16,171	60	31	29	2	0	30*
Dec. 1932	29,570	71	12	11	1	5	7
Jan. 1933	35,529	131	36	36	0	10	26
Feb. 1933	27,298	85	29	28	1	9	13†
Totals	130,950	446	117	113	4	28	81

\*No tissues available, 1 specimen.

†No tissues available, 7 specimens.

Note: The number of hogs retained for arthritis was 0.34 per cent. There were 139,923 swine condemned on postmortem inspection during the fiscal year ending June 30, 1932, at the principal abattoirs in the United States.\* Of this number, 6,675 (4.77 per cent) had arthritis and other bone diseases. It is possible that a large percentage of these cases were afflicted with chronic erysipelas.

## CONTROLLING THE DISEASE

A careful case history of each outbreak under consideration should be made, and special attention directed to the matter of immunization against hog cholera. Schoening<sup>6</sup> says:

A point of importance is the fact that both swine erysipelas and hog cholera can exist in the same herd at the same time and that a positive reaction to the agglutination test for swine erysipelas does not eliminate the possibility of the presence of hog cholera.

Thus the knowledge that a herd has been properly immunized against hog cholera is very important in making a probable diagnosis. Recent purchase of new animals, contact with known centers of infection, buying feed from unknown sources, polluted streams and other vital factors should receive attention as possible sources of infection. Isolation of sick animals, and rigid sanitary measures, should be instituted on infected premises in attempting to control the disease. Vaccination with immune serum has proved of value in cases where the malady has been diagnosed in the early stage.

#### SYMPTOMS

In giving the symptoms of swine erysipelas, various writers recognize more than one type of the malady. A convenient classification which embraces all phases of the disease is the following:

1. Acute (septicemia).
2. Subacute.
3. Chronic (arthritis, skin involvement).

In the acute state, the disease is characterized by a sudden onset, with marked prostration and elevated temperature ranging from 106 to 108° F. The skin is of a purplish or reddish cast, especially over the belly. Diarrhea may be marked and the feces blood-stained. Occasionally the urine is bloody. Vomiting may occur, there is loss of appetite, death may occur within a few hours, and the mortality is high.

Symptoms in the subacute type are less marked than those noted in the acute. When aroused, the afflicted animal moves suddenly and may have convulsions. There is weakness and a tendency to incoördination of the hind legs. Grinding of the teeth sometimes is noted. Well-marked erythema may be present. A slightly elevated temperature and a purple skin are likely to be noted in the acute. When aroused, the afflicted animal moves sick animal appears to relish filthy food more than clean. The gait is "stilted." Loss of weight is noted, the animal is stunted and becomes unprofitable, resulting in serious economic loss. This form of the disease may terminate fatally or progress into the chronic stage.

In the chronic type one finds arthritis, or advanced sloughing of the skin, tail or ears in all stages, varying in degree from mild to severe disfigurement (fig. 1). The gangrenous-back types show a hard, leather-like crust which gradually curls up, eventually falling off (fig. 2). Unthriftiness is always marked. Even though the mortality is low in this type, many animals

become carriers of infection. Such animals, when sold on the market, often result in heavy loss to the owner.

#### DIFFERENTIAL DIAGNOSIS

In the acute cases, swine erysipelas is to be distinguished from hog cholera. Examination of tissues in the laboratory is quite essential in determining the presence of the erysipelas organism. Since the time for the appearance of agglutinins in acute attacks of swine erysipelas is not known, the rapid or tube method of agglutination should not be relied upon in making a differential diagnosis, as negative results may be misleading. In the experience of the writers, to date, all acute cases encountered have given negative results to the rapid test; however, the erysipelas organism was recovered from these cases. Nutritional disorders, rickets,



FIG. 1. Case of swine erysipelas, showing arthritis, chronic type. Note large joints, arched back, and "sprung knees."

pyogenic infections, rheumatism, ergotism, mange, post-vaccination troubles, swine plague, flu, necrotic enteritis, and anthrax should be considered in making a final diagnosis.

The rapid blood-test, devised by Schoening, Creech and Grey,<sup>7</sup> appears to be a valuable diagnostic agent for the chronic form of swine erysipelas, and its application in the field for a herd diagnosis, or in the laboratory, is simple and quick, requiring from one to two minutes. This test has been applied by the writers in making 201 positive diagnoses of the chronic type in the Denver laboratory. The antigen used was furnished by the Washington laboratory in all instances.

## PATHOLOGICAL FINDINGS

The average field postmortem examination usually will reveal a variety of lesions, depending on the type of infection, virulence of the outbreak, and the length of time a given animal has been afflicted. External lesions, if present, will be observed on the skin, varying from a mild dermatitis to an extensive sloughing (frozen backs) on various parts of the body. The presence of arthritis should be noted. At times the tail and ears are involved to a considerable degree. In conducting an autopsy, the possibility of hog cholera should always be borne in mind. The presence of petechiae on the epiglottis and kidneys, as well as the character of the lymphatics, should be carefully observed. Sufficient time should be given to conduct a thorough and exhaustive postmortem examination. To confirm the diagnosis, tissues should be sent to the nearest laboratory.



FIG. 2. Hog showing chronic sloughing-back type of swine erysipelas (frozen back).

In the acute form, well-marked morbid changes may be absent or very slight. The lymph-nodes usually are enlarged, edematous, and often hemorrhagic. Acute swelling usually occurs in the spleen, and enlargement of the liver is frequent.

Observations made by Dr. J. O. Wilson, in South Dakota and Colorado, are summarized as follows:

In the comparatively few cases that I have seen posted, the anatomical changes have not been well marked. I think the lesions most frequently observed are enlarged, watery lymph-glands,

spleen sometimes enlarged, a fibrinous exudate in the peritoneal cavity and along the intestinal tract. The amount of fibrin deposited varies from just a few short shreds in some cases to a considerable quantity in others. Cauliflower-like growth on the heart valves, given in the textbooks as a characteristic lesion, has been observed by us to date in but two instances. To my mind the most characteristic lesion we have observed is a peculiar, reddened appearance of the stomach wall which the German textbooks describe as having a paint-brush appearance. We have observed this in a number of cases and it resembled very much the stroke of a paint-brush. The diagnosis has been confirmed in every instance where this lesion was found on postmortem examination.

In cases observed in Colorado during the spring and summer of 1932, I have failed to find some of the postmortem manifestations rather frequently encountered in South Dakota, *e. g.*, lymph-glands in Colorado cases might be described as more or less hemorrhagic rather than watery (pale); fibrin deposits, with one possible exception, have been conspicuous by their absence; no cauliflower-like growth on heart valves in Colorado cases have been observed; inflammation of the serous surface of the stomach wall has been noted in but one instance in Colorado, having the appearance of a slight and diffuse inflammatory process rather than the well-marked, characteristic paint-brush appearance previously described.

Gastro-intestinal lesions sometimes are noted. An excessive inflammation of the mucous membrane of the stomach may occur. There may be hemorrhages in the muscular coat of the intestines, likewise in the mucosa of the urinary bladder. Most writers note the vegetative, cauliflower-like growths on the valves of the heart, in the chronic type. In the arthritis type, enlarged joints show a simple inflammatory process, with a flaky synovial fluid present, or ankylosis may have occurred with fixation of the joint. One or more joints may be involved (figs. 3 and 4). In the examination of a recent case, where eight joints were involved, one joint showed pedunculated strands of connective tissue resembling a papillomatous growth. There was erosion of the cartilaginous surfaces, and an increase of the connective tissues. The synovial fluid was flaky and had a reddened, blood-tinged appearance.

#### LABORATORY FINDINGS

During the past year, there have been 298 swine specimens received at the Denver branch laboratory which were suspected of having erysipelas. Of this number, 210 cases have proved to be positive for swine erysipelas, and 88 negative for this disease. The positive cases were diagnosed by either the rapid blood-test or by cultural method. Of the total number of positive blood tests to the rapid method, 82 samples were forwarded to the pathological laboratory at Washington to be checked by both the tube test and the rapid agglutination method. The results obtained in the two laboratories are as follows:

<i>Denver</i>		<i>Washington</i>	
Rapid method	.....82	Rapid method	.....82
		Tube method	.....79

The three samples that failed to react to the tube test at Washington were badly hemolized, which made the reaction doubtful. Aside from these three cases, the two laboratories checked on their findings. The synovia from 40 chronic arthritis cases in which the blood was positive also gave a positive agglutination test in every instance. This point may be of value in selecting specimens for laboratory examination where blood is not available. Synovia from the joints of a number of normal hogs gave negative results. Blood from 37 head of hogs apparently normal, collected on the killing-floor (Denver), showed 36 negative and one positive to the rapid test. These animals were slaughtered as mixed lots and their origin was unknown.

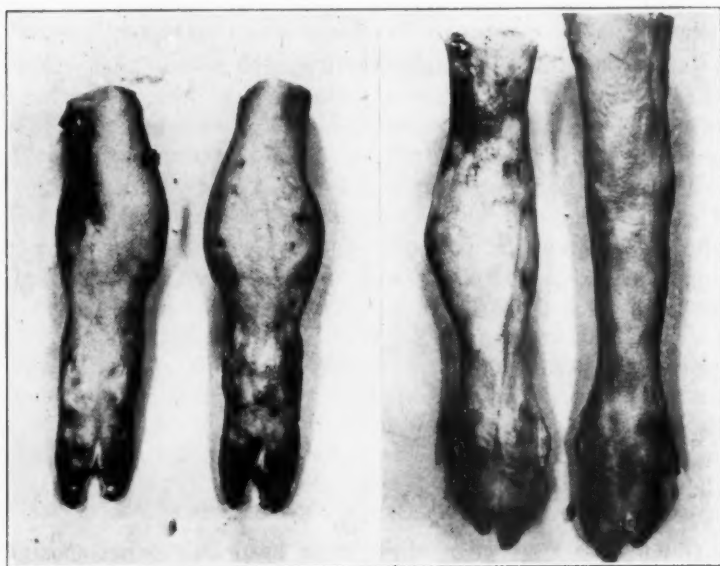


FIG. 3 (left). Swine erysipelas. Enlarged joints from a retained carcass showing both carpal (knee) joints involved.

FIG. 4 (right). Enlarged tarsal (hock) joint from a retained carcass, shown with normal joint.

The specimens recorded in this report include eight acute cases; sloughing skin or urticarial lesion cases, 8; and 203 specimens showing arthritis. All acute cases were negative serologically, but cultures were positive for swine erysipelas. Sloughing-back cases were diagnosed serologically; only two of these were

available for culturing and both proved negative bacteriologically. There were five cases of urticaria or "diamond skin" disease, not included in our report, which were both serologically and bacteriologically negative. From one other case of urticaria, however, the swine erysipelas organism was recovered from the skin lesions. The blood in this instance was negative serologically. Of the 203 specimens of arthritis received, 194 were positive to the rapid test, and nine were negative. Of the arthritis specimens, 151 were cultured, with recovery of the organism from the joints in 47 instances. In one case the organism was isolated from the spleen in addition to the joints.

#### FIRST POSITIVE CASE

The first case of positive swine erysipelas in Colorado diagnosed by the writers was on July 7, 1932. This animal was a two-month-old pig which was raised near Cope, Washington County, Colorado. It came from a herd of 120 head, with a death loss of 32 during June, which consisted of three sows and 29 suckling pigs about six weeks old. The cause of death was suspected swine erysipelas. At the time of the first visit, 25 other pigs of the same age were showing arthritis.

A live pig from the lot showing arthritis was brought to the laboratory and slaughtered for autopsy. Cultures were prepared from the various tissues. The organism of swine erysipelas was isolated only from the joints. Bouillon cultures of the purified strain killed a pigeon in four days, with recovery of the organism. This culture was confirmed by the laboratory at Washington. Another pig from the same lot was taken to Dr. I. E. Newsom, at the Colorado Agricultural College, who also isolated and identified swine erysipelas organisms from the joints. This experience preceded the visit of Dr. H. W. Schoening, chief of the Pathological Division, to the Denver office in August, 1932. While in Colorado, Dr. Schoening made several field inspections of suspected swine erysipelas, and applied the rapid blood-test which he had previously introduced in South Dakota for making a herd diagnosis.

On two premises where 50 per cent loss occurred, tissues from dead swine showing no external lesions were cultured and the swine erysipelas organism was recovered from the lung, liver, spleen and kidney. Cultures from one of these two cases killed a pigeon within four days with recovery of the organism. In one of these cases, the rapid blood-test was negative; the other was not tested. Nevertheless, other sick swine in these herds did show arthritis and their blood proved positive to both the rapid

and tube tests; the blood from ten other hogs, not showing arthritis, failed to react to the rapid test.

#### ISOLATION OF THE ORGANISM

The largest number of cultures have been obtained from joints in arthritis cases, where the organism in most instances appeared to localize. One joint only was cultured from each carcass; many animals, however, showed multiple joint involvement. One each of bile and brain cultures was negative in chronic arthritis cases. A few initial cultures from the joints have proved to be pure. Others were contaminated with streptococci or diplococci. On plain agar, or in bouillon, difficulty was experienced in growing the organism when the reaction of the medium varied materially from pH 7.4. The most constant culture was obtained by using liquid broth media, purified by plating. Special serum-agar and Russell's double-sugar agar proved of value. Difficulty was experienced in culturing the organism on solid media from synovia in affected joints of long standing cases. In these same specimens the organism of swine erysipelas developed in bouillon, and when transplanted on solid media they grew rapidly.

#### CHARACTERISTICS OF THE ORGANISM

For the purpose of this paper, only a brief description of the organism will be given, as other writers, including both Creech and Ward, have fully detailed its characteristics.

The swine erysipelas organism is a minute, non-motile rod, varying according to age and culture media, from about 1 to 5 microns in length, occasionally in long filaments, and less than 0.5 micron in width. Cultures on solid media appear after 24 to 48 hours as minute, round, pearly, glistening, grayish-white colonies, pin-point in size, and increase only slightly after incubation for three or more days. The growth is never abundant. In broth a slight, uniform turbidity occurs without pellicle or ring. A slight sediment develops with age. In gelatin stab cultures, a characteristic test-tube, brush-like appearance develops after a few days, without liquefaction. The following sugars were broken down with the formation of acid, but no gas: dextrose, lactose, levulose and galactose. No acid or gas formation occurred in saccharose, salicin, dulcitol or mannitol.

#### ANIMAL INOCULATIONS

For routine purposes the writers have used pigeons for inoculation. White mice also are susceptible. Pigeons receiving 0.5 to 1.0 cc of a 24-hour broth culture succumbed within two to five

days, and the organisms were recovered readily from the internal viscera in all instances. A total of 18 pigeons died as the result of injection with the swine erysipelas organism isolated during this investigation. Five birds succumbed in two days, five in three days, six in four days, and two in five days. Three of the five pigeons dying in two days received cultures which have been recovered from other pigeons dead of erysipelas. It is probable the virulence was increased by passage through these pigeons. Two cultures kept in stock for more than six months killed pigeons in three and four days respectively.

#### DISCUSSION

The writers consider this paper as a report of progress in the study of swine erysipelas. Some new factors have developed which will require an exhaustive study of this disease. Some of the points for future consideration are the geographical distribution, the seasonal occurrence, the age incidence, carriers, modes of transmission, the examination of more specimens of blood from normal hogs, and a careful study of the sloughing-back and diamond-skin types of the disease. The length of time required to develop agglutinins after infection, also the period these agglutinins remain in the affected animal, are important items. The relation of swine erysipelas to human medicine and its relation to public health should be considered among workers handling swine.

#### SUMMARY

1. From a total of 298 swine specimens, suspected of having erysipelas and received during a twelve-month period, 210 cases of positive swine erysipelas have been diagnosed, with 88 negative results.
2. Of the 210 positive cases of erysipelas, 201 were positive serologically, with eight acute and one skin cases showing negative results by the rapid whole-blood agglutination test.
3. From a total of 82 positive blood samples reacting to the rapid test in Denver, 82 (100 per cent) gave positive reactions to the rapid test also at the Washington laboratory.
4. Of the 82 samples positive to the rapid test, 79 were positive to the tube method also, as applied by the Washington laboratory. The three negative samples were hemolyzed, which made the tube reading doubtful.
5. The rapid whole-blood agglutination test devised by Schoening, Creech and Grey appears to be a valuable diagnostic agent in chronic cases of erysipelas.

6. In 40 positive blood cases, the synovia likewise was positive in every instance. Synovia from several normal joints was negative to the rapid test. This is a valuable point in securing specimens from chronic cases (unincised joints) when blood is not available for examination.

7. Swine erysipelas has been found in ten counties in Colorado, and the disease is reported from 16 other states, *viz.*, Alabama, Idaho, Iowa, Illinois, Indiana, Kansas, Missouri, Nebraska, New Mexico, New York, Ohio, Oklahoma, South Dakota, Texas, Virginia and Wyoming.

8. During five months there were 130,950 swine slaughtered in federally inspected establishments in Denver. Of these, 446 (0.34 per cent) showed arthritis. Of the 446 arthritis cases reported for the five-month period, 117 were tested for swine erysipelas, 113 were positive and four negative to the rapid test.

9. Swine erysipelas appears to be established in many localities in the United States and its economic importance constitutes a problem to be considered in the live stock industry.

#### ACKNOWLEDGMENT

Valuable data and assistance are acknowledged, in the preparation of this paper, from Drs. J. O. Wilson, E. N. Stout and E. A. Meyer, of the field inspection service; also from Dr. J. E. Shelton, in charge of meat inspection, and the veterinarians under his supervision at Denver, Colo.

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#### Why They Are Called Geese

A flock of wild geese, flowing southward, did not like the looks of the courthouse at Marshall, Mo., and attacked the electrically lighted dome *en masse*, reports the *American Field*. The next day, the city electrician had to replace 26 light bulbs.

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# PRIMARY MESOTHELIOBLASTOMA OF THE BOVINE OMENTUM\*

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## INTRODUCTION

The recognition of primary neoplasms of the serous membranes as a more or less independent group is of recent date and, therefore, of controversial nature. Although these neoplasms are met with infrequently in tumor pathology, Krumbein,<sup>1</sup> during an analysis of a primary carcinoma of the pleura, was able to collect not less than 30 names in the literature for tumors of similar structure and location. In one of the newer textbooks, Lund<sup>2</sup> expressed the opinion, which has dominated for a long time, that the neoplastic growths of the serous membranes probably belong to the angioblastic sarcomas, or more specifically to the lymphangio-endotheliomas. In recognition of the unsatisfactory state regarding a definition of endothelial new growths, MacCollum<sup>3</sup> stated that a tumor of any unusual pattern was likely to be classified as an endothelioma. Feldman,<sup>4</sup> in his monograph on neoplasms of animals, accepted the modern classification of tumors of the serous membranes current in human pathology and differentiated sharply between endothelial and mesothelial new growths.

The modern classification of the tumors of the serous membranes is based upon the embryogenetic conception, elaborated by Hertwig, that the primitive celom resulting from a split in the mesoderm is the parent structure of the pleural and peritoneal cavities. The lining cells of the cavities, although similar in function to epithelial and endothelial elements, are conceived to be of mesodermal origin. These cellular structures, which were termed mesothelium by Adami, have been thought by Cunningham<sup>5</sup> to be highly specific in function and morphology, but Maximow<sup>6</sup> was able to show that the mesothelial cells are endowed with various potentialities. Under normal conditions in the adult, he found the serous membranes to consist of loose richly vascularized connective tissue, which is delimited by mesothelial elements; a membrana propria of the latter structure was lacking.

The mesothelial cells lining the lumen are usually flat and poor in protoplasm; they may in some animals be cylindrical or epithelium-like. Their free surface is characterized by a brush-like

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border; they are rich in chondriosomes and lipoid inclusions, and possess two centrioles connected by a central flagellum. Under abnormal conditions the brush borders and inclusions regress, and the cellular bodies swell and become rounded. In this state the nucleus is slightly eccentric, large and vesicular, and rather poor in diffuse chromatin; the chromatophile elements appear to be condensed along the nuclear membrane and in a prominent nucleolus. Mitotic figures are common, and the cells often form roof-tile-like layers with consequent degeneration of the peripheral members. They are distinguished from histiocytes and exudate polyblasts by their lack of phagocytic power; finally, they develop into fibroblasts, a metamorphosis which is explanatory of the formation of adhesions in the serous cavities.

In the embryo and in the newborn animal the differentiation of the mesothelial cover cells from the underlying connective tissue of mesenchymal origin is much less marked. Maximow recognized the possibility of mesothelial elements giving rise to neoplastic growths. Such histogenetic principles were applied to the classification of new growths of the serous membranes, especially by Scott,<sup>7</sup> in England, and by Klemperer and Rabin,<sup>8</sup> in this country. Klemperer and Rabin differentiated between local so-called giant tumors arising from the subserous mesenchymal elements and resembling fibroblastomas, and diffuse tumors arising from, and being composed of, the superficial structures, the mesothelioblastomas.

The occurrence of the latter type of tumors in the lower animals is very rare. Feldman<sup>4</sup> listed only seven cases, including three of his own observations, out of a large number of tumors examined; three of them were observed in the bovine species, but only one case, namely, that observed by Purmann<sup>9</sup> in a calf on the killing-floor, appears to be comparable in location to the case to be described.

#### CASE REPORT

The subject of this study was a 14-month-old Holstein heifer raised in a tuberculosis-free herd. The animal was said by the owner to have suffered from chronic indigestion, but was never known to have been acutely ill. On returning from the pasture the animal appeared lame in the hind legs; it stumbled over a rock and died within 30 minutes. The sudden inexplicable death was the cause of the present inquiry. Postmortem examination was performed four hours after death. The heifer was fairly well developed and covered by a somewhat roughened coat of hair.

The anus protruded and revealed some hemorrhagic discharge; the blood was lacking in coagulability. When the abdomen, which was already slightly distended by postmortem changes, was opened, a tumor-like growth of the size of a large apple protruded through the initial incision. The abdominal cavity contained about two gallons of hemorrhagic fluid, and the parietal surface of the great omentum in almost its entire extension was covered by multiple tumors.

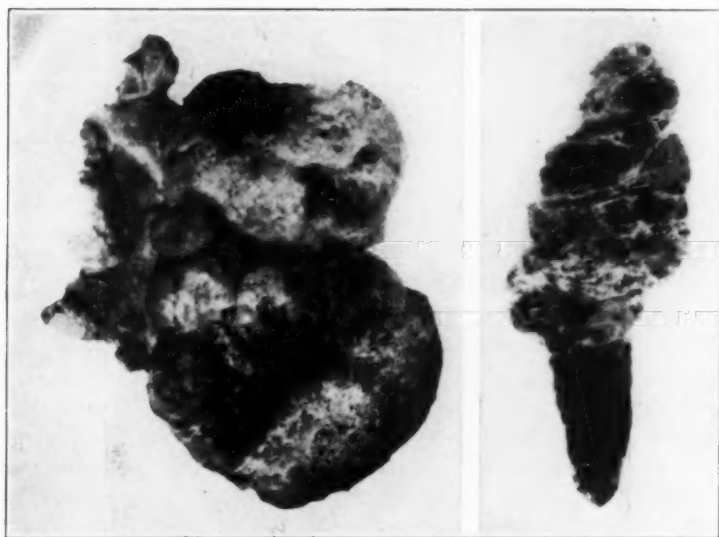


FIG. 1 (left). Two units of the neoplasm from the parietal omentum; note secondary nodules ( $\times \frac{1}{2}$ ).

FIG. 2 (right). Cross-section of a flat unit showing marbled appearance due to hemorrhages ( $\times \frac{1}{2}$ ).

Most of the neoplastic units appeared to be broadly pedunculated, and ranged in size from two to five inches in diameter; small (apparently secondary) nodules were often attached to the main units (fig. 1.) The tumors were of a spongy consistency and of a grayish-yellow basic color which was relieved, however, by many hemorrhagic areas (fig. 2). The digestive organs, *sensu strictu*, were not invaded by the tumor and, except for a certain paleness, appeared to be normal. Two pigeon-egg-sized neoplastic nodules of similar structure were found on the margin of the right lung. The power to metastasize, although poorly developed, is noteworthy; in only one other case, namely that described by Scott,<sup>7</sup> in the mesentery of a hamster (*Cricetus frumentarius*), is there a record of a corresponding observation.

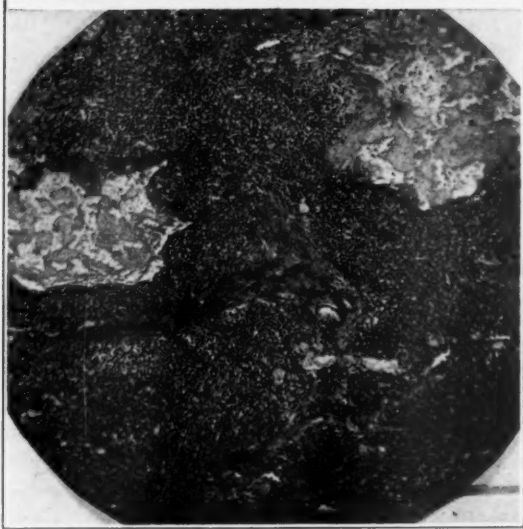
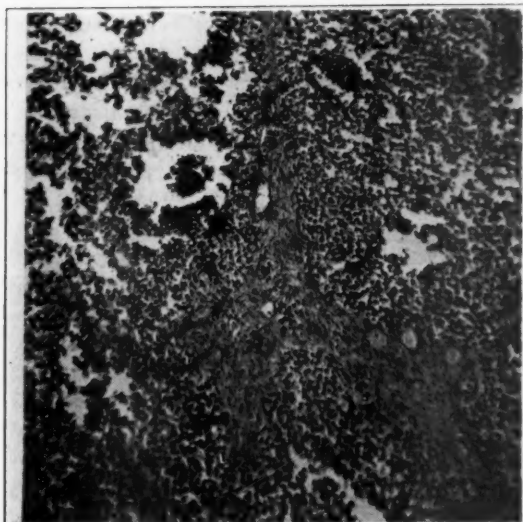


FIG. 3 (above). Detail relation of stroma (in form of inverted letter Y) to surrounding parenchyma (x 100).

FIG. 4 (below). General arrangement of tumor; one cyst each in upper right and left quadrants; in the center, connective tissue stroma in form of letter Y (x 70).

## MICROSCOPIC STRUCTURE

Sections prepared from various parts of the neoplasm, including the metastases of the lung, exhibited in general a remarkable uniformity of the cellular elements and their architecture. The connective tissue stroma, endowed with an autonomous vascular system (fig. 3), showed fair development, but without dominating the picture in any section of the tumor. It appeared to support large epithelium-like outgrowths which in some places formed cystic structures; the cysts contained desquamated cells and polymorphonuclear leucocytes, but principally homogeneous serous fluid (fig. 4). Nowhere was there an apparent tendency of the tumor parenchyma to form vascular channels. In many sections the type cell was present, so to speak, in pure culture, with only a slight admixture of collagen fibers. In other sections the characteristic cells seemed to be compressed by erythrocytic extravasation; near the free surface of the units the type cells appeared to be somewhat flattened. These regions usually were infiltrated by polymorphonuclear leucocytes (fig. 5), but a mature mesothelial covering could not be recognized. Wherever inflammatory reactions predominated, the type cells gave evidence of injury in the form of chromatolytic changes (fig. 5). In the "healthy" tumor tissue the type cell was characterized by a large, pale, vesicular nucleus, with chromatin concentrated in fine granules along the nuclear membrane, and in one, rarely in two, prominent nucleoli (fig. 6).

The elements close to the lumen of the cysts not infrequently exhibited pseudopod-like processes of the protoplasm. The size of the type cell was extremely variable, but always exceeded that of polymorphs. Very large inflated structures and a few multinucleated giant-cells occurred. Mitotic figures were comparatively few in number, and small. The most interesting feature of the type cell was the extreme pleomorphism of the nucleus, brought about by various degrees of indentation (fig. 7). These progressive stages were suggestive of amitotic division leading to binucleated cells. In some cases multiple cleavage produced a four-leaf-clover-like (fig. 7f) outline, and central degenerative changes may have been responsible for the signet-ring-like appearance depicted in figure 7h. With respect to the nuclear figures suggestive of amitosis, it should be remembered that certain of the forms (fig. 7b) correspond to Maximow's<sup>6</sup> rounded mesothelial cells intermediary between the flat mature form and the fibroblast. On the other hand, the progressive indentations which, of course, in certain stages, recall the familiar form of the endothelial leucocyte, have been frequently observed in embryonic

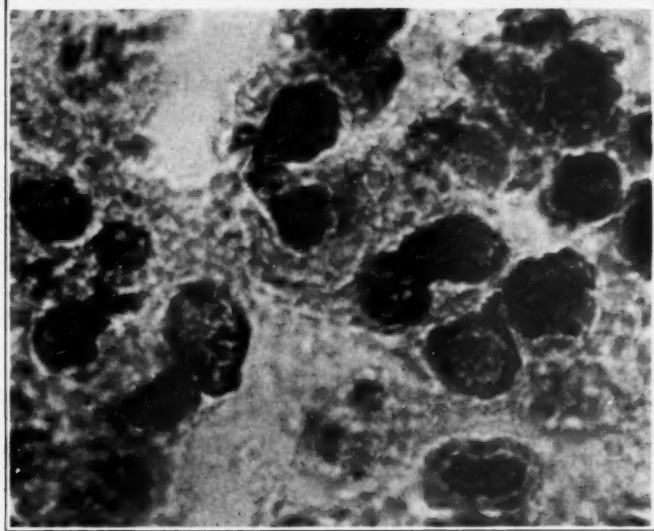
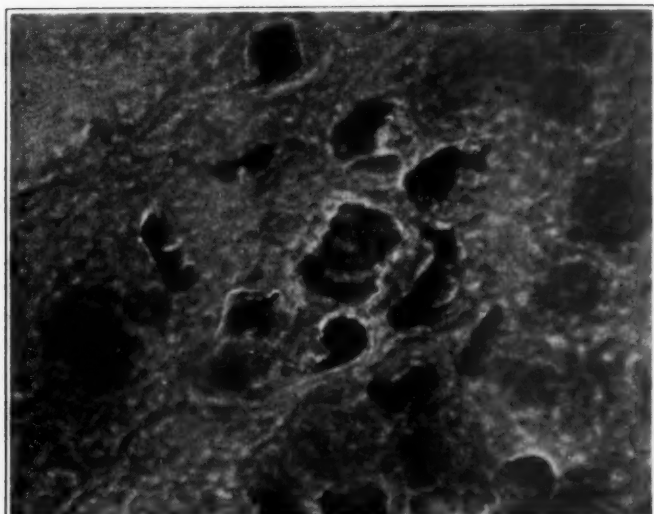


FIG. 5 (above). "Inflamed" area of tumor; center shows a chromatolysed mesothelial cell, surrounded by a swarm of polymorphonuclear leucocytes (x 1800).

FIG. 6 (below). "Healthy" tumor tissue consisting of mesothelial cells of which the nucleus is in various stages of indentation. The cells in the right lower quadrant show the characteristic sharp nuclear membrane and large eccentric nucleolus (x 1800).

mesenchyme cells and are thus illustrated by Maximow.<sup>10</sup> That this author is not convinced of the occurrence of true amitosis under normal conditions is of no direct bearing here.

There remains the morphologic evidence, seemingly contradictory, that the cellular elements of a primary neoplasm of the

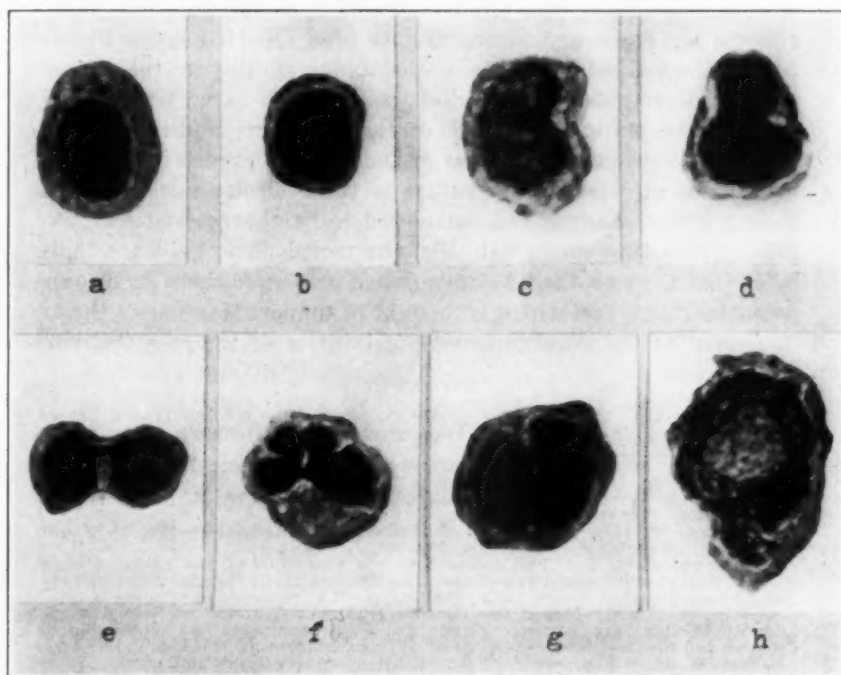


FIG. 7. Isolated type cells in various stages of indentation, suggestive of amitosis (a-g); b resembles Maximow's rounded mesothelial cell of inflamed tissue; f, multiple amitosis (?); h, signet-ring-like nucleus, possibly due to central degeneration (x 1800).

mesothelium exhibited characters of both the mesothelial and the mesenchymal tissues. If, however, one gives due consideration to Maximow's interpretation of the varied potentialities of the mesothelial cells in the adult, and the lack of differentiation of the former from mesenchymal elements in the immature animal, the present finding must be considered to be in support of Maximow's thesis. In view of the observed multiple expansive growth of the neoplasm, and of the rather long duration of the affection, as judged from the clinical history, it is probable that the tumor consisted of mesothelial elements which had preserved most of their embryonic potencies.

## SUMMARY

A primary mesothelioblastoma of the parietal great omentum, which metastasized to a limited extent in the lung, was apparently responsible for an internal hemorrhage which caused the sudden death of a 14-month-old heifer. Only one other case which, although non-fatal, was similar in so far as the host and parts affected are concerned, seems to have been reported in the literature. The cellular elements of the tumor studied by the writer resembled rounded mesothelial cells which are transitional between the mature cover cell of the serous membrane and the fibroblast. Progressive stages of indentation suggestive of amitosis were an outstanding feature of the vesicular nuclei. Since these nuclear changes are considered to be characteristic of undifferentiated mesenchymal cells, the morphologic evidence indicated that the mesothelial elements had preserved their embryonic potentialities, a fact which is thought to support Maximow's thesis in regard to the developmental possibilities of the mesothelium.

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## Honoring Dean Francis

The meeting of the State Veterinary Association of Texas to be held in conjunction with the A. & M. College of Texas Short Course for Veterinarians, at College Station, June 4-6, 1934, has been designated the Mark Francis Meeting, and will honor the life work of the popular Dean of the School of Veterinary Medicine. This celebration is especially fitting at this time, because of the major building program which has been completed recently at the School.

# AN UNSUCCESSFUL EFFORT TO INCRIMINATE DAIRY GOATS IN THE TRANSMISSION OF UNDULANT FEVER IN COLORADO\*

By ROBERT LEARMONTH and IVAN C. HALL

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This study was suggested by the well-known relation of goats to the transmission of undulant fever to man through infected milk in the countries bordering the Mediterranean Sea,<sup>1,2</sup> in Texas<sup>3</sup> and in Arizona,<sup>4-6</sup> the wide prevalence of infectious abortion in dairy cattle due to a closely related, if not essentially identical, etiological cause,<sup>7-13</sup> the occurrence of human cases of undulant fever in Colorado,<sup>14</sup> and the presence of a considerable population of goats in Colorado whose milk is used by tuberculous patients.

The goat population of Colorado was 30,512 in 1929.<sup>15</sup> Our studies were limited to Adams, Arapahoe, Denver and Jefferson counties, of which the combined goat population in 1930 was 1,059. We secured samples from 198 animals from all of the outlying parts of the city; 116 were pure-bred or high-grade Toggenburgs; 13 were Nubians; 69 were Saanens, but no Maltese or Angora goats were tested.

As soon as we began to solicit blood samples we encountered the opposition of the goat-owners to having their animals bled, which was peculiarly reminiscent of the experience of the Malta Fever Commission in 1905; blood samples were secured, however, from 70 goats in eight different herds, but from 128 animals it was possible to secure only milk samples. Both blood and milk samples were tested from 39 goats; blood-serum tests only were made on 31.

## METHODS OF MAKING AGGLUTINATION TESTS

Blood samples were drawn aseptically from the jugular vein into sterile tubes, allowed to clot, and the serum clarified by centrifugalization.

Milk samples of 1 to 15 cc were drawn separately from the udder halves into sterile corked tubes containing a few cubic centimeters of chloroform and about 1 cc of Wyeth's extract of rennet. Each tube was recorded and shaken thoroughly to extract the milk fat in the chloroform and to mix the rennet thoroughly with the milk. Upon arrival at the laboratory, the tubes

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were placed in the incubator for about an hour to coagulate the casein and then were centrifugalized at 2000 r. p. m. for 15 minutes to separate the clear serum which was then pipetted directly into 0.85 per cent NaCl solution in dilutions of 1:10, 1:100 and 1:1000. These dilutions were doubled by the addition of equal amounts of antigens in the tests.

The rationale of this procedure has been explained in previous papers.<sup>16,17</sup> Carbon tetrachlorid served equally well as chloroform; neither inhibited agglutination of *Bacterium melitensis* in milk serums to which a positive human serum had been added prior to treatment, and neither solvent caused spontaneous agglutination.

Two cultures of *B. melitensis* were used in the preparation of agglutinating antigens, as follows:

- (1) *B. melitensis* (var. *abortus*) 5471, received from the National Institute of Health, Washington, D. C., as their No. 456.
- (2) *B. melitensis* 5009, isolated from case 2 in the Colorado General Hospital.<sup>14</sup>

These cultures were grown on beef heart infusion 2 per cent agar with 2 per cent peptone for 72 hours, removed in 0.5 per cent phenolized 0.85 per cent NaCl solution, filtered through sterile cotton to remove clumps and standardized to a turbidity of 300. These antigens were used separately in all of the tests in equal amounts with the above serum dilutions, and always gave similar results with positive human serum of which a control set always was included with each lot of goat blood or milk tested. This positive human serum gradually deteriorated, however, during the period of investigation, from a titre of 1:2,000 to 1:640.

Mixtures of diluted serums and antigens were made in small serum-tubes and incubated at 37° C. Reactions were read at 24 and 48 hours but none of the negative tests on first reading ever became positive on the second.

None of the samples of milk serum agglutinated either antigen at any dilution of serum and only one of the blood serums gave a somewhat questionable reaction at 1:20. This animal was sold out of the city before a second sample could be secured. There was thus no evidence that goats harbor *B. melitensis* infection in or near Denver. We likewise have no evidence that any of those connected with the goat milk industry here have suffered from undulant fever. We feel, however, from our subsequent comparison of blood serums with milk serums in cows, as well as

from a study of the literature, that milk serums are less satisfactory for agglutination tests than blood serums and that final judgment regarding goats should be reserved until more blood samples have been examined.

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### Texas Ladies Adopt Emblem Pin

The Ladies' Auxiliary to the State Veterinary Medical Association of Texas has adopted an emblem pin and, in so doing, becomes, as far as is known, the first organization of ladies to adopt a pin symbolic of the veterinary profession. Other auxiliaries that may be interested in adopting such a pin are invited to correspond with Mrs. U. E. Marney, secretary of the Texas Auxiliary, P. O. Box 386, San Antonio, Tex.

The Ladies' Auxiliary meets concurrently with the State Veterinary Medical Association of Texas and, at the meeting held in Temple, January 15-16, 1934, about 30 ladies were in attendance.

## SOME HISTORICAL NOTES ON CONTAGIOUS PLEURO-PNEUMONIA\*

*By J. P. FOSTER, Minneapolis, Minn.*

It has occurred to the writer that our members might be interested in a review of the history of a disease, the "suppression and extirpation" of which was largely responsible for establishing, by Act of Congress on May 29, 1884, the Bureau of Animal Industry, of the United States Department of Agriculture—an organization conceded to be the most efficient of its kind that the world has ever known. The disease to which reference is made is contagious pleuro-pneumonia, or lung plague of cattle.

During the early "nineties," members of Congress from the state where the writer then resided were able to keep their political fences in a fairly good state of repair by forwarding to their grateful constituents a few packages of garden seeds, as well as copies of the book, "A Special Report of the Diseases of the Horse," and "A Special Report of the Diseases of Cattle." What were more commonly known as the "Government Horse Book," and the "Government Cattle Book," could be found in nearly every farm or ranch house in that part of the country, and in many instances were quite as thoroughly read as was the Montgomery Ward catalog. The description of the lesions of contagious pleuro-pneumonia, and the highly colored plates depicting the so-called "marbling" of the affected lungs, were of special interest to the writer, who, several years later—when a student of veterinary medicine—listened to the admirable description of the disease as given by Professor Andrew Smith. Subsequently the more important points of the lecture were "drilled into" the writer in the never-to-be-forgotten "sweat box" of the college. This was nearly seven years after the last animal suffering from the malady had been destroyed, and although hopes were entertained that the disease had been eradicated completely in this country, lectures on contagious pleuro-pneumonia continued to be delivered in the veterinary schools of the United States and Canada for many years.

A period of over forty-one years now having elapsed since the last case of the disease in question was discovered in this country, it is not surprising that but brief reference is made to this malady in the veterinary teaching of today. Modern veterinary curricula are so crowded with considerations of present-day prob-

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\*Presented at the thirty-seventh annual meeting of the Minnesota State Veterinary Medical Society, Saint Paul, Minn., January 25-26, 1934.

lems, that it seems a waste of time to "rattle the dry bones" of a disease that was so completely eradicated more than two generations ago. The writer feels that the only justification to be offered for what might be termed the "exhuming" of this disease is the refreshing of the memories of the older members, and in bringing to the attention of the younger members one of the outstanding achievements of their profession — the eradication of contagious pleuro-pneumonia of cattle in the United States.

Contagious pleuro-pneumonia is said to have existed in Switzerland and Germany in 1713. It appeared in England in 1735, and at the end of the eighteenth century had spread over the entire German Empire, France and Italy. It was carried from Holland to South Africa in 1854, and in 1858 it appeared in Australia, to which country the infection was carried by a cow imported from England. The disease first appeared in the United States in 1843.

Contagious pleuro-pneumonia is caused by a filtrable virus. Pöls and Nolen, in 1886; Nocard and Roux, in 1896, and Arloing, in 1897, isolated certain organisms in connection with the disease, none of which has been accepted as an etiologic factor.

The symptoms of the disease vary greatly, depending upon whether the malady assumes an acute or chronic form. In the acute form there is a marked suspension of normal secretions and excretions, accompanied by the usual symptoms of pneumonia and pleurisy such as rapid and difficult respiration, painful cough, and high temperature. In the chronic form, which is more difficult to diagnose, the animal may suffer from a cough for several weeks before other symptoms develop. The temperature is elevated, appetite is impaired, and constipation is present. Auscultation and percussion may disclose the progress of the disease in the affected lung. It is said that in advanced cases there may be bulging of the intercostal spaces. Many other symptoms have been described, mention of which time and space will not permit.

Various definitions have been proposed for the disease. After reviewing the writings of a large number of authors, some of whom have written voluminously regarding the causes, symptoms, and pathology of the malady, it is quite evident that the outstanding lesions presented in a typical case of contagious pleuro-pneumonia consist of (1) a marked increase in the volume of the connective tissue elements of the affected lung, (2) hepatization of the pulmonary parenchyma, and (3) intense exudative pleuritis. While in agreement as to the outstanding changes mentioned, there appears to be a lack of accord as to the exact pathological processes responsible for these changes.

It will be remembered that the connective tissue framework of the lungs of ruminants is remarkable for the thickness of the septa which constitute the boundaries of the individual lobules. These interlobular septa are derived from the subserous envelope of the lung, and their peculiar development and distribution account for certain characteristic pneumonic lesions in the larger ruminants. In contagious pleuro-pneumonia the connective tissue structures become markedly thickened, and appear on cross-section as yellowish white lines, or bands, running through the lung substance. The lymph-spaces between the strands of connective tissue are distended with a sero-fibrinous exudate. Moore considers this increase in connective tissue due to a "progressive interstitial pneumonia," while Hutyra and Marek attribute these interlobular changes to an "exudative inflammation of the interlobular lymph-vessels." The contrast in colors between these thickened bands and the hepatized lobules constitutes the so-called "marbling," which is so characteristic of this disease.

The lobules constitute the parenchyma, or essential tissue of the lungs. At the center of the lobule is the ultimate or terminal bronchiole. The bronchiole is divided distally into clusters of prolongations known as infundibuli, the walls of which are formed by the alveoli or air-vesicles. The alveolar walls are lined by respiratory epithelium. These structures, supported by a certain amount of reticular tissue, and surrounded by capillaries, nerves and lymphatics, are the tissues which take part in the process of hepatization. Depending upon the age of the lesions, the colors of the hepatized lobules range from a cloudy yellow or a dirty gray, to dark red or brown; the latter colors indicating those parts most recently affected. The blood-vessels are filled with thrombi, and the lymph-spaces are enormously distended with a serous fluid. Later, the entire lobule may undergo necrosis, and sequestration ensues. Finally, the entire lobe or a portion of the same may undergo induration, cicatrization or suppuration.

The pleural sac may contain a large quantity of sero-fibrinous exudate, and both the visceral and parietal pleurae may be markedly thickened and covered by areas of fibrinous deposits. Pleuritic adhesions are quite often in evidence.

As a usual thing, only one lung is affected—more commonly the left one. In a case in which a single lobe is involved, it will be noted that there is a very definite line of demarcation between the diseased area, and what still appears to be normal pulmonary tissue. The hepatized lobe is markedly thickened, and the sur-

face is raised above the surrounding normal structures. In chronic cases in which more than one lobe has been involved, it has been noted that the lobe first affected has undergone such degenerative changes that it has become a mass of dense cicatricial tissue. It is stated that a diseased lung may weigh 100 pounds, and a single lobe has been known to weigh 40 pounds.

The scope of this paper will not permit of more than passing mention of the spread of contagious pleuro-pneumonia from Brooklyn, N. Y., in 1843, to at least ten other states and the District of Columbia. The states which were invaded by the disease were Delaware, Illinois, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, Ohio, Pennsylvania and Virginia. The last case of contagious pleuro-pneumonia known to exist in the United States was destroyed in the suburbs of Newark, N. J., on March 25, 1892. Thus, it will be noted that the disease was a menace to the live stock interests of our country for nearly a half-century.

It cost the National Government \$1,509,100.72 to eradicate the disease in the United States and required about five years. If the states had been prepared with laws and funds as they are now prepared, probably it could have been accomplished within one year.

The United States was the first of the large nations of the world up to that time which, having been once extensively infected with contagious pleuro-pneumonia, was able to extirpate it completely. When it is considered that there were grave doubts entertained of the possibility of eradicating pleuro-pneumonia, that the States were not prepared to coöperate effectively, that serious opposition was met on almost every hand, and that other countries had labored a much longer time and made greater expenditures of money without success, the favorable outcome must be regarded as a great achievement for the new Bureau of Animal Industry. It accomplished the first great thing it undertook, the paramount purpose for which it was created. ("The Bureau of Animal Industry of the United States Department of Agriculture," by U. G. Houck, B. S., V. M. D.)

Probably there is no one within the hearing of the writer's voice who has ever seen a case of contagious pleuro-pneumonia, and it is also probable that there are some present who never have seen a case of glanders—a disease that is becoming so rare that our veterinary teaching institutions are unable to secure affected animals for clinical demonstrations before their student bodies. Twenty-five years ago, in certain parts of this country, glanders was one of the most prevalent diseases encountered in veterinary practice. In one year, the writer saw 148 cases of glanders in horses and three cases in the human. Dourine is unknown in the United States at the present time, and it seems as though the control, if not the eradication, of bovine tuberculosis may be hoped for in the not too distant future. On

December 1, 1933, thirteen states were listed as being modified accredited areas, signifying their practical freedom from bovine tuberculosis.

To be identified with the profession that has been instrumental in the stamping out, or the controlling, within the borders of our country, the scourges mentioned, should be a source of pride and satisfaction to all veterinarians.

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### National Dog Week

Plans are now in progress for the observance of National Dog Week, September 16-22, 1934. It is the hope of those who are sponsoring the celebration that this Week will be the most successful of any observed since the movement was started in 1928, under the leadership of Will Judy, editor and publisher of the *Dog World*.

The Executive Committee includes many names well known in the realm of dogdom. Represented are prominent veterinarians, humane workers, sportsmen, dog breeders and dog lovers. Among the veterinarians who are serving on the Committee are: Dr. L. W. Goss (O. S. U. '05), of Columbus, Ohio; Dr. H. Preston Hoskins (U. P. '10), of Chicago, Ill.; Dr. John B. Jaffray (Chi. '03), of Chicago, Ill.; Dr. E. E. Romberger (U. P. '21), of Reading, Pa.; Dr. William E. Ruggles (Colo. '27), of Portland, Ore., and Dr. W. T. Scarborough (K. C. V. C. '17), of Raleigh, N. C.

National Dog Week is a "non-profit movement for the benefit of dogs." The objects are praiseworthy:

1. A dog in every home.
2. Better dogs and better care for all of them, pedigreed or not pedigreed.
3. To educate dog owners as to their obligations both to their dogs and to the public generally.
4. To teach kindness and consideration by children and adults toward dogs and animals in general.
5. To emphasize the use of the dog as a home protector and faithful companion.
6. To secure fair and just laws for dogs and their owners.

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### The Age of Gentleness

For preaching against cruelty to animals in 1772, the Rev. James Granger, vicar of Shiplake, was reprovved by his Bishop and denounced by his congregation for prostituting the pulpit. The second sermon of a similar nature sent him to prison.

*Veterinary Record.*

## DISINFECTION OF POULTRY HOUSES BY MEANS OF "FIRE GUNS"\*

### A Preliminary Note

By H. J. STAFSETH, *East Lansing, Mich.*

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and FERNANDO CAMARGO, *Mexico, D. F., Mexico*

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Experiments carried out on a large poultry farm in Mexico, with the latest model of a so-called "fire-gun," showed that such organisms as the colon bacillus, staphylococci, streptococci and *Salmonella pullorum* survived an exposure to the flame for ten and fifteen seconds. This does not speak well for any attempts at disinfecting poultry-houses with fire. If an exposure of 20 seconds would kill these organisms, it would take about eleven hours to disinfect just the floor of a house 20 x 100 feet. When it comes to the disinfection of perches, dropping-boards and nests (wooden), the fire-torch becomes entirely unsatisfactory, since it is impossible so to manipulate it as to reach all surfaces, corners and crevices. The claim made in poultry magazines that a house 12 feet square can be disinfected in ten minutes by this method is, therefore, without any scientific foundation whatever.

\*Received for publication, March 30, 1934.

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### Phi Zeta Initiation

The annual initiation ceremonies of Gamma Chapter of Phi Zeta, national veterinary honor society, were held at the Memorial Union, Iowa State College, April 19, 1934. A banquet was served, following which several short addresses were given.

The following members were initiated from the faculty: Drs. Dwight A. Smith, S. C. Whitlock, L. H. Schwarte and C. D. Lee. Seven members of the senior class were elected active members as follows: Joe E. Akin, Roger M. Cocking, Harold L. Geick, Marion Jones, Robert M. Parker, Lester Proctor and Earl M. Walker. Two juniors were elected: Alfred G. Karlson and George W. Mather. Two honorary members were initiated: Dr. Guy G. Graham and Dr. N. L. Nelson. At a special meeting held in June, 1933, Dr. C. W. Deming, of Des Moines, was initiated as an honorary member. Dr. Deming had been elected to membership earlier in the year, but was unable to be present when the regular initiation ceremony was held.

## OBSERVATIONS ON THE SUBCUTANEOUS VACCINATION OF HEIFERS AGAINST BANG'S DISEASE DURING CALFHOOD\*

By A. L. DELEZ, LaFayette, Ind.

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In a previous report,<sup>1</sup> the writer presented results obtained with a limited number of heifer calves vaccinated during the first month of age by the intravenous method. Another group of 14 heifer calves was obtained for further study. All the animals were negative to the agglutination test except two, one giving a reaction of 1:50 and the other 1:20.

Between the third and fourth months of age, subcutaneous injections were given of a bovine strain of *Brucella* which produced visible lesions in guinea pigs. Each animal received 10 cc of a suspension that measured 0.2 cc of bacteria by the Hopkins tube procedure and which corresponds approximately to the density of tube 5 of the McFarland nephelometer. Three months later, a second injection of the same strain was given to three heifers. Each animal received the 72-hour growth of an agar slant suspended in 5 cc of physiological salt solution.

The heifers were bred between 17 and 18 months of age. The sire had been constantly negative to the agglutination test since birth. Before exposing the heifers, the agglutination tests were conducted with an antigen corresponding approximately to the density of tube 3 of the McFarland nephelometer. The antigen used following the exposure compared to tube 1 of the above scale.

Exposures were given orally in the fifth month of pregnancy. Seven heifers received the 48-hour growth of an agar slant of a virulent *Brucella abortus* culture suspended in 200 cc of physiological salt solution. Three of these animals were given a second similar exposure in the seventh month of gestation. Two heifers were given a single exposure in the same manner except that the suspension was prepared from the growth of a slant picked from a "rough" colony developed from the same culture used to expose the other heifers.

Heifers 101, 103, 111 and 114 received one vaccine injection and were exposed to a virulent *Br. abortus* culture of the "smooth" type. Heifers 101, 111 and 114 gave high reactions following the vaccine treatment but the titres receded from 1-1,000 to 1:50, or completely negative by the fifth month following the injection. These three heifers were all negative to the test when

\*Received for publication, April 11, 1934.

exposed. Heifer 111 failed to react following exposure, while the maximum titres in heifers 101 and 114 were 1:500 and 1:250 respectively. Heifer 103 did not react above 1:100 until the tenth month following the calfhoo injection, when the titre reached 1:500 and then it subsided. Heifer 101 aborted in the seventh month of pregnancy. *Br. abortus* was obtained from the placenta and from the uterus and left front quarter of the udder when the animal was killed 16 days later. Heifers 103 and 111 dropped full-term living calves. The calf of heifer 103 was somewhat weak at birth but later developed normally. At parturition this heifer showed *Br. abortus* infection in the colostrum and placenta and again in the uterus and udder when the animal was killed five days later. No infection was recovered from heifer 111, either at parturition or from the uterine and udder tissues, when this material was obtained for examination eight days following calving. Heifer 114 gave birth to a small calf, 94 days following exposure. The infection was found in the colostrum at parturition and also in the uterus and udder at autopsy two days later.

Heifer 108 received one vaccine injection and two "smooth" exposures, the first at the fifth month and the second at the seventh month of gestation. The blood titre was 1:20 in the first month of life but the animal was negative when vaccinated. No marked antibody response was given following vaccination and the animal became negative seven months after the injection. The titre was 1:100 at parturition. A full-term living calf was dropped 109 days following exposure. *Br. abortus* infection was obtained from the colostrum and placenta and also from the uterus and udder 14 days after calving.

Heifer 104 was given two vaccine injections at three-month intervals previous to breeding and one exposure to the "smooth" culture during pregnancy. In the third month of life, the blood titre was 1:50, but the serum became negative at the fourth month when the first vaccine injection was given. The highest reaction was 1:200 in the first month following the second injection. A fully developed dead calf was dropped 109 days subsequent to exposure. *Br. abortus* infection was recovered at parturition and also from the tissues at autopsy six days later.

Heifer 110 received two vaccine injections at intervals of three months and two "smooth" exposures after pregnancy was established. The titre arose to 1:500 following the first vaccine injection but dropped below 1:20 two months later. Following the second injection, the titre ascended to 1:500 again and then dropped until eight months later, when the animal became negative and remained negative thereafter. Calving occurred nor-

mally at 83 days following the second exposure. No infection was demonstrable in this animal, either at parturition or at autopsy twelve days later.

Heifer 106 received one vaccine injection and was exposed once to the "rough" form of the culture used for exposing the other heifers. The reaction was 1:200 following the vaccine injection and dropped to 1:20 three months later, after which the animal became negative. Following the exposure there was no reaction until subsequent to parturition, when the titre was 1:100. A full-term normal calf was born 121 days following exposure. *Br. abortus* was obtained at parturition, and ten days later from the uterus when the animal was killed.

Heifer 107 received two vaccine injections at three-month intervals and was also exposed once to the "rough" culture used for heifer 106. The titre was 1:200 following the first calthood injection and then dropped to 1:20. Following the second injection, the titre arose to 1:1,000 after which it gradually became negative. At parturition the titre was 1:50. A living calf, somewhat weak, was born 142 days following exposure. *Br. abortus* organisms were not obtained from this heifer either at parturition or when the animal was killed four days after calving. A streptococcus was isolated from each horn of the uterus.

Control heifer 109 remained negative to the agglutination test until exposed with the vaccinated heifers in the fifth month of pregnancy. Twenty days following the exposure, the titre was 1:500. A fetus 50 cm long was aborted 36 days following exposure. *Br. abortus* infection was recovered from the fetus, placenta and colostrum, and also from the uterus and udder when the animal was killed eleven days later. Control heifer 113 remained negative to the test throughout the experiment and received no exposure. The animal was killed in the fifth month of pregnancy. Examination failed to reveal *Br. abortus* infection.

#### DISCUSSION

In an earlier experiment,<sup>1</sup> abortion was readily induced by intravenous exposures in two heifers which had given only slight agglutination reactions following calthood injections of *Br. abortus*. Following oral exposures in the nine vaccinated principals in this experiment, one aborted and one gave birth to a dead calf. *Br. abortus* infection was isolated from the heifer that aborted (101), from the heifer (104) that gave birth to a dead calf, and from four (103, 106, 108 and 114) of the seven heifers that dropped living calves.

Vaccine injections failed to stimulate an antibody response in some cases, while in other animals the titres dropped after the

first or second month following the injections. This was observed in the case of the two heifers (104 and 108) which gave slight reactions before receiving vaccine injections. Another heifer (110) received two vaccine injections, which were followed by transitory reactions, and no agglutinin response occurred following two oral exposures during pregnancy.

Three heifers (104, 107, 110) which were given two calfhood injections dropped living calves. The infection was recovered from one (104).

The ability of "rough" types of *Br. abortus* to induce abortion in vaccinated heifers was studied in two cases (106 and 107). Both animals delivered living calves and the organism was recovered as a "smooth" form in one case (106). It is possible some "smooth" types were included in the exposing dose and were responsible for the establishment of the infection. The other heifer (107) may have developed greater resistance due to the administration of two vaccine injections during calfhood.

#### SUMMARY

Fourteen heifer calves were obtained for a calfhood vaccination experiment. Eleven were vaccinated subcutaneously with a *Brucella abortus* culture which had a fair degree of pathogenicity for guinea pigs. Three animals were kept as controls. One heifer calf died before vaccination and one died immediately following vaccination. Exposures were given by the mouth in the fifth month of pregnancy.

Seven of the nine vaccinated heifers carried through the experiment dropped living calves. *Br. abortus* was recovered from four of these animals. One vaccinated heifer aborted and one dropped a dead calf. Both of these animals were infected with *Br. abortus*.

One control died and one failed to conceive until the latter part of the experiment. This heifer was killed in the fifth month of pregnancy and no infection was demonstrated. A third control, which was exposed, aborted and *Br. abortus* infection was recovered.

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- <sup>1</sup>Delez, A. L.: Studies in calfhood immunization against Bang's disease. Jour. A. V. M. A., lxxxi (1932), n. s. 34 (2), pp. 239-245.

"Now, why," mused the freshman in a state agricultural college, "do I have to take courses in husbandry to get my bachelor's degree?"

## SOME ASPECTS OF INFECTION AND IMMUNITY IN EQUINE ENCEPHALOMYELITIS\*

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Despite the great amount of investigative effort devoted to the study of the specific equine encephalomyelitis originally described by Meyer, Haring and Howitt,<sup>1</sup> the relatively short time since the first conclusive etiological studies were made has not permitted the evolution of more than assumptive or at most cursory knowledge of the natural methods of transmission of this virus infection. Kelser's<sup>2</sup> work was outstanding and proved conclusively that the mosquito, *Aedes aegypti*, could transmit the disease under experimental conditions and much of our present epizootological evidence strongly supports the idea of insect vectors as the natural disseminators of the virus. Through the coöperation of Majors Simmons and Reynolds of the U. S. Army, the writers were able to confirm Kelser's findings as regards transmission of the infection from guinea pig to guinea pig by *Aedes aegypti*. The decisiveness of Kelser's results led us to undertake the exposure to infected mosquitoes of a considerable number of horses, the majority of which had been treated previously with an experimental vaccine; the others being normal controls. Due to technical difficulties in handling the mosquitoes, we were unable to obtain as heavy exposure by the insects as that reported by Kelser in his transmission work. No apparent infection occurred and we believe the failure to secure evidence of infection could be explained on a basis of insufficient exposure.

During the latter part of a severe outbreak on a premise in Maryland in the early fall of 1933, approximately 1,500 mosquitoes of various species were collected by the Bureau of Entomology, U. S. Department of Agriculture, and submitted to us for study. The insects were divided into groups and, after trituration in saline, were injected intradermically into a large number of guinea pigs as a test for the presence of virus in the mosquitoes. The results of these inoculations were negative, but since the possible demonstration of virus in mosquitoes collected during an outbreak is largely a matter of chance, such a procedure would necessarily have to be undertaken on a large scale before results could be obtained warranting a definite conclusion.

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Another method of possible natural transmission is by inhalation and Vawter and Records<sup>3</sup> have shown that the disease may be transmitted in the horse by intranasal instillation of the virus. This method has been suggested as one of the probable means of spreading Borna disease. One horse which we exposed by intranasal instillation of "western" virus developed encephalomyelitis, whereas one of two exposed by the same method to "eastern" virus developed only a transient general reaction but was shown to carry virus in the blood at that time. However, doubt is cast on this method as a natural mode of transmission since we have failed to transmit the disease to healthy susceptible horses by subjecting them to the most severe and intimate contact with infected animals and their surroundings (feed, water and litter) and as far as we are aware no one has demonstrated infection in horses by contact under properly controlled conditions.

As a possible third mode of natural infection, we suggest the entrance of the virus through abrasions of the oral mucosa and offer the following experiments in support of this theory: Eastern virus in the form of brain suspension in saline was rubbed into the pricked and scarified mucosa of the tongues of two horses. One animal developed typical encephalomyelitis with concurrent blood infection and was destroyed *in extremis*; the other manifested a slight rise in temperature only. Western virus prepared by suspending guinea-pig foot-pad lesions\* in saline was similarly inoculated into the tongues of four horses. In two of the animals an indefinite local lesion was produced as well as encephalomyelitis mild in character with concurrent virus in the blood of one. A third animal developed a slight febrile reaction only while the fourth horse manifested neither local nor general reaction. It is conceivable that a susceptible horse with fresh oral lesions might become infected from ingesting materials contaminated in any manner by virus.

Other methods of exposure which are deemed wholly unlikely to occur in nature have been undertaken. Beginning with intracerebral inoculation it was found that with one exception all animals (more than 20), presumably not previously exposed, developed the disease. In the exceptional case the animal manifested no observed evidence of encephalomyelitis when inoculated with a virus demonstrated to be lethal for guinea pigs. One of three horses inoculated intradermically with oxalated guinea-pig

\*This virus material was furnished by Dr. W. M. Mohler, of this Division, who at the time had carried both western and eastern types of virus through more than 50 passages in guinea pigs by pad inoculation.

blood collected from animals 48 hours after intracerebral inoculation with western brain virus developed the disease. In the case of eastern virus, one of two animals injected intradermically with 5 cc of a 2 per cent brain-virus suspension developed a slight transient reaction and was shown to carry virus in the blood during this period. Of two horses inoculated intramuscularly with eastern brain-virus suspension, one succumbed to encephalomyelitis. Of six horses inoculated subcutaneously with 5 to 10 cc of 20 per cent eastern virus, three died of encephalomyelitis, one developed a very mild depression and two remained normal. In the three reacting animals virus was demonstrated in the blood 24, 36, and 48 hours after inoculation.

In the above-described tests and others not included here, virus has been demonstrated in the blood of two horses infected with western virus and in eight instances of eastern virus infection by various methods of exposure. In all cases the virus was recovered during the earlier stages of the disease. These positive findings of virus in the blood of horses, together with those of Howitt<sup>4</sup> and of Kelser,<sup>5</sup> lend definite evidence that virus does occur not uncommonly in the blood of artificially induced encephalomyelitis and clearly indicates that the opportunity exists for biting insects to obtain virus from the blood of infected animals.

#### IMMUNITY STUDIES

Recognizing from the early report of Meyer,<sup>6</sup> of infection resulting from the subcutaneous inoculation of live virus into susceptible horses and from the evidence obtained later in the writers' work, that unmodified live virus was, if not dangerous, possibly not entirely suitable for immunizing purposes for a disease of which relatively so little was known, a search was begun for other means of utilizing virus in active immunization. A 33 $\frac{1}{3}$  per cent saline suspension of brain was treated with 1 per cent chloroform. This product, while possessed of some apparent merit in protecting guinea pigs against intracerebral inoculation, was quite variable in that there appeared to be no regularity in the interval required to inactivate the virus. Phenol in the usual percentages, rather than being virucidal, appeared to approach a preservative in nature, but formalin to 0.4 per cent in a 10 per cent saline suspension of finely triturated brain, demonstrated to contain active virus before formalization, was found regularly to destroy the activity of virus in such a suspension within 1 to 3 days.

This product was first prepared from sterile guinea-pig brains pressed through a 30-mesh copper screen, after which the sus-

pension in saline and the addition of formalin were effected. The preparation when held at room temperature for the first day, and subsequently in the refrigerator at about 5° C., being shaken vigorously for about five minutes each day, was found on the second to fourth days to be inactive as judged by the intracerebral inoculation of guinea pigs. Often such a product was very toxic for guinea pigs when so soon tested and to obviate this possibility as well as to demonstrate that the formalin exerted more than an inhibiting power upon the virus, the formalin was neutralized by the addition of ammonia in suitable amounts. Neither the dilution of ammonia used in itself nor the formalin-neutralized virus suspension prepared as above indicated produced any toxic effect in inoculated animals and no evidence was obtained after, at most, four days that the virus possessed activity sufficient to infect the guinea pigs. Accordingly, it was interpreted that the virus was "dead." It has been clearly demonstrated by several series of tests that such a vaccine administered subcutaneously in at least 1-cc amounts in two doses, separated by an interval of seven to 15 days, definitely protects guinea pigs exposed to active virus inoculated intracerebrally or intradermically on the tenth to 20th day after completion of the immunization procedure. Apparently immunity is more firmly established after the longer interval.

Both types of virus (eastern and western) have been tested in this fashion with the same result. Repeated attempts to discover any evidence of cross-immunization between the two types have failed, which, together with the fact that guinea pigs treated with live virus are protected only against the homologous virus and previous reports of serological and immunological differences,<sup>7, 8</sup> again furnish further proof of the plurality of the viruses.

In the early tests of the formol vaccine in horses it was found that the intracerebral inoculation was too severe an exposure for the purpose of demonstrating protective action of the vaccine. Indeed, we were able to show that such exposure with eastern virus was capable of producing encephalomyelitis and death in a horse which had received two doses of vaccine and one injection of living virus subcutaneously. Unfortunately we have been unable to find a method of exposure other than intracerebral which would regularly result in a 100 per cent infection. However, tests have been conducted by employing as exposure methods the intranasal instillation of the virus and by subcutaneous injection.

A test, in which two vaccinated horses (guinea-pig vaccine—western type virus) and a control (non-treated) horse were exposed by intranasal instillation of 50 cc of a 5 per cent saline suspension of guinea-pig brain (western type virus) resulted in the development of encephalomyelitis and death in the control only. (Twenty-five cc of vaccine was injected subcutaneously, 6-26-33 and again 7-6-33, in one animal while the other received 50-cc doses on the same dates. The two vaccinated animals and the control were exposed on 9-22-33.)

In the case of eastern virus vaccine the exposure was made by subcutaneous inoculation which we have found to be quite an effective method. Eichhorn<sup>9</sup> also reports deaths from subcutaneous inoculation of eastern virus. In table II are given the details

TABLE I—*Immunity tests of guinea pigs treated with formol-killed vaccine.*

GUINEA PIG	ADMINISTRATION OF FORMOLIZED VIRUS		INTRACERE- BRAL EXPOSURE	RESULTS
	1ST DOSE	2ND DOSE		
4102 4317 4303 4270 4104 4271	2-6-34 (Eastern type)	2-13-34 (Eastern type)	0.2 cc of 1:100 suspension of eastern virus (3-1-34)	Remained normal Encephalomyelitis Remained normal Remained normal Remained normal Remained normal
3022 3001 4107 4111 4108 4112	Non-vaccinated controls			Encephalomyelitis Encephalomyelitis Encephalomyelitis Encephalomyelitis Encephalomyelitis Encephalomyelitis
4258 4521 4320 4261 4251 4308	2-6-34 (Western type)	2-13-34 (Western type)	0.2 cc of 1:100 suspension of western virus (3-1-34)	Remained normal Remained normal Remained normal Remained normal Remained normal Remained normal
4103 4125 4113 4124 4106 4115	Non-vaccinated controls			Encephalomyelitis Encephalomyelitis Encephalomyelitis Encephalomyelitis Encephalomyelitis Encephalomyelitis

\*Delayed. Death on tenth day in this instance.

of an immunity experiment with vaccinated horses in which the exposure was by the subcutaneous method. It will be noted that two horses were treated with vaccine prepared from guinea-pig brains (GP) and two were treated with vaccine prepared from horse brain (H). All vaccinated horses survived, while three of the four controls developed the disease, two succumbing.

The formolized vaccine derived from either guinea pig or horse brain has been injected subcutaneously in three or more places, slowly, many times in working and idle horses of all types, without producing a general reaction or local abscessation. In some animals there has occurred a moderate swelling which has been attributed in part to the formalin content of the inoculum, or perhaps to a too rapid or poorly distributed injection.

TABLE II—*Immunity test of horses treated with formol-killed brain vaccine and exposed by subcutaneous inoculation.*

HORSE	SUBCUTANEOUS VACCINE INOCULATIONS		EXPOSURE SUBCUTANEOUSLY 4-10-34*	RESULTS†	VIRUS IN BLOOD DURING FEBRILE REACTION
	2-26-33	3-8-33			
756	25 cc GP	25 cc GP		No symptoms	Negative‡
757	50 cc GP	50 cc GP		No symptoms	Negative
758	25 cc H	25 cc H		No symptoms	Negative
759	50 cc H	50 cc H		No symptoms	Negative
765	Non-vaccinated controls		10 cc	Slight illness accompanying rise in temperature; recovery	Positive§
766				No symptoms	Negative
767				D. Encephalomyelitis	Positive
769				D. Encephalomyelitis	Positive

Key: GP = Inactive formolized (0.4 per cent) saline suspension (10 per cent) guinea-pig brain.  
H = Inactive formolized (0.4 per cent) saline suspension (10 per cent) horse brain.

\*Exposure consisted of the subcutaneous inoculation of 10 cc of a bacteriologically sterile 20 per cent saline suspension of guinea-pig brain (eastern virus) which was shown by intracerebral inoculation in guinea pigs to be disease-producing.

†The test animals were held under observation for 30 days without further developments.

‡Virus not recovered from blood by guinea-pig inoculation at any time during a ten-day interval of observation.

§Virus recovered from blood by guinea-pig inoculation, 24 hours, 36 hours and 48 hours, but not subsequently in tests conducted b.i.d. to tenth day.

## DISCUSSION

From the experimental and epizootological evidence it appears quite likely that insect vectors play a part in the natural transmission of the disease. Other modes of infection can not be excluded at this time. The repeated demonstration of the virus in the blood of horses exposed by subcutaneous and other methods of inoculation would indicate the possible danger of a living vaccine as an immunizing agent even though it possessed a low degree of virulence, such as that reported by Records and Vawter.<sup>10</sup>

Our experiments, although quite limited, would indicate the possibility of the development of a vaccine which would have a practical application.

## SUMMARY

Experimental evidence would tend to limit the probable natural modes of infection to: (1) insect transmission, (2) infection by way of the nares, (3) by introduction of virus through oral abrasions, with indications of a more or less constant viruliferous state of the blood during the earlier stages of the disease. Guinea pigs have been actively immunized by use of formol-killed vaccine of both eastern and western types to a degree sufficient to cause them to withstand exposure, the intensity of which probably never obtains in nature. Horses treated with formol-killed vaccine were protected against subcutaneous and intranasal infection either of which method simulates what may be expected to occur in nature.

Further experimental work is necessary to determine the efficacy of vaccinations as a practical procedure.

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# CLINICAL AND CASE REPORTS



## POTT'S DISEASE IN A PIG\*

By L. B. SHOLL, *East Lansing, Mich.*

*Michigan State College*

and D. R. COBURN, *East Lansing, Mich.*

*Michigan Bureau of Animal Industry*

The subject is a three-year-old grade female pig. The owner purchased her at an auction sale some time ago, and she has been on pasture since that time. Lameness started to develop in the hind quarters about three weeks prior to examination, and posterior paralysis developed about one week later. Anorexia developed, and on advice of a veterinarian she was brought in for examination.

The animal is in good flesh but shows complete paralysis of the hind parts. The conjunctivae are congested. The temperature is 106.4° F. With the consent of the owner she is killed for autopsy.

The skin and subcutaneous tissues are negative, and much subcutaneous fat is present. A majority of the lymph-nodes throughout the body show more or less extensive involvement by tuberculosis, especially marked in the submaxillary lymph-nodes. These lesions consist of caseous areas of various sizes, quite well encapsulated, and containing considerable granular calcareous material. The head and neck are negative except for the tuberculous lymph-nodes mentioned above. The pleura is negative. The lungs show some congestion. A considerable number of grayish-yellow tubercles 1 to 2 mm. in diameter are scattered quite generally through the lung tissue. The heart is negative. In the spleen there are two small tubercles just under the capsule. The pancreas is negative. Several small tubercles are scattered through the liver, which shows some congestion. The stomach and intestines are negative. The kidneys, urinary bladder, and genital organs are negative.

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There is marked involvement of the vertebrae by tuberculosis. The sixth thoracic, the last thoracic, and four lumbar vertebrae show typical tuberculous lesions, their bodies being quite largely replaced by connective tissue and caseous and calcareous material. In the lumbar region one tubercle is so large that it causes extreme pressure on the spinal cord, accounting for the posterior paralysis.

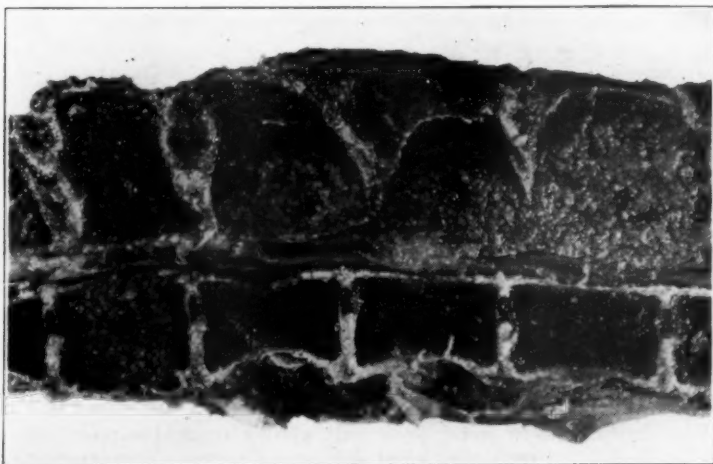


FIG. 1. Tuberculosis lesions (1, 2, 3, 4) in vertebrae of pig. Note the marked compression of the spinal cord at 3 and 4.

By means of cultures and animal inoculations the organisms are found to be the avian type.

### AN UNUSUAL DEFECT OF NEWBORN PIGS\*

By E. H. HUGHES, Davis, Calif.

*Division of Animal Husbandry, College of Agriculture  
University of California*

Drummond<sup>1</sup> *et al*, reporting on "The Nutritive Value of Lard," fed a group of purebred Berkshire pigs toppings and synthetic whey, composed of casein, lactose, olive oil, and a salt mixture, the chemical analysis of which was similar to ordinary whey. Experiments with rats had shown such a diet to be almost devoid of vitamins A, B and C. The pigs did well for a considerable length of time but ultimately showed retarded growth and lost their healthy appearance.

\*Received for publication, March 20, 1934.

A sow in the group was continued on the same ration until September 23 of the same year, when it was supplemented with cod-liver oil. The oil was given in the following amounts: one-fourth ounce for five days; one-half ounce for 42 days, and one ounce for 20 days. She was taken to the boar December 3, became pregnant and was returned to the original deficient diet.

Zilva<sup>2</sup> and co-workers, discussing in a later paper, "The Relation of the Fat-Soluble Factor to Rickets and Growth in Pigs," state that this sow farrowed eight pigs on March 30 and all were born dead except one. This individual lived for five hours and was normal except for a slight general edema. Of the seven other pigs four showed marked imperfections of the hind legs. The abnormality was particularly pronounced in the case of two of them (fig. 1).

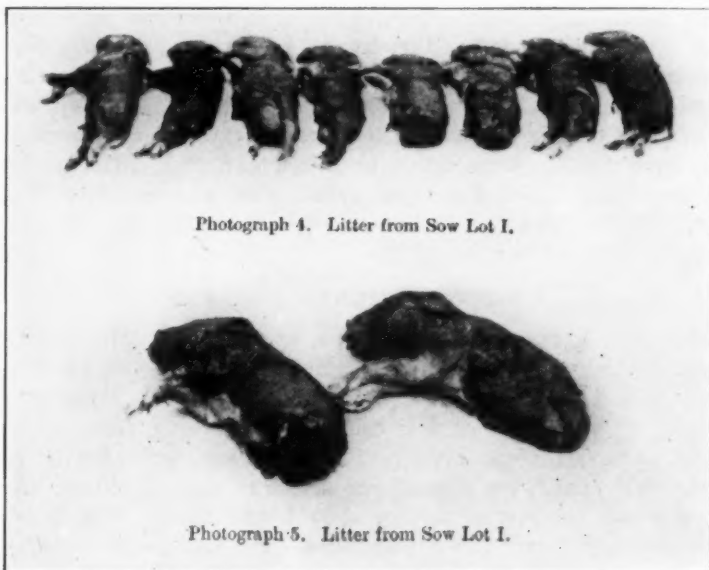


FIG. 1. Litter reported by Zilva<sup>2</sup> and co-workers.

A similar occurrence was noted in the California Experiment Station herd in 1932. A purebred Poland China gilt was farrowed on March 21, 1931. Her mother was fed a normal diet of barley, wheat middlings, tankage, salt and lime, and had free access to alfalfa pasture. Her pigs were weaned and one gilt was placed on an experimental diet on May 23 of the same year. With others of the same group, she was kept on concrete

floors without access to the soil or pasture and was fed barley, 96.5 parts; casein, 1.5 parts; calcium carbonate, 1 part; salt, 1 part. Each animal in the lot was given 5 cc of cod-liver oil daily until May 28, 1932, when the amount was increased to 10 cc. They had free access to sunlight. Such a diet we believed would be sufficient for growth, reproduction, lactation and physical well-being.

At twelve months of age, the gilt under discussion weighed 222 pounds, which is subnormal, but she seemed to be in excellent health. On April 6, she came into heat and was mated with a young purebred Duroc Jersey boar. She farrowed six pigs weighing a total of eleven pounds, on July 27. Three of the pigs were small and died soon after birth. On postmortem examination they seemed normal except that they were weak and undersized. The three other pigs were normal in weight and strength, but were definitely deficient and abnormal in their rear extremities (fig. 2). They were healthy, lived 24 hours, were killed, photographed, and preserved in formalin solution. In appearance they were strikingly similar to those reported by the English workers. The mother of this litter, maintained on the same diet and bred to the same boar, produced a normal litter of pigs on December 22 of the same year. She was negative to the agglutination test for *Br. abortus* on February 24, March 25, July 25 and October 24, 1932.

#### DESCRIPTION OF ABNORMAL PIGS

*Pig A:* A male pig with testes about three-eighths normal size. There was no opening where the anus should have been and the tail was about  $\frac{3}{8}$  inch in length, curved backward and sideways. One hind leg was apparently perfectly formed to the stifle joint, where it ended. Skin and hair covered the part completely except for a small projection of skin extending downward where the rest of the leg should have been. The other leg was partially formed to a point above the hock, where the tibia projected through the skin for a distance of about  $\frac{3}{16}$  inch. The skin adhered tightly to the bone. There was no fibula present.

*Pig B:* This was a male pig with testes about one-half normal size. Like pig A there was no anus, the tail was about  $\frac{1}{2}$  inch in length, curved upward and backward along the back. Both hind legs were the same and similar to one leg of pig A. There was no fibula present in either and the tibia projected through the skin as in the former case.

*Pig C:* A female pig with generative organs and anus apparently normal. The tail was about  $1\frac{1}{4}$  inches in length, turned

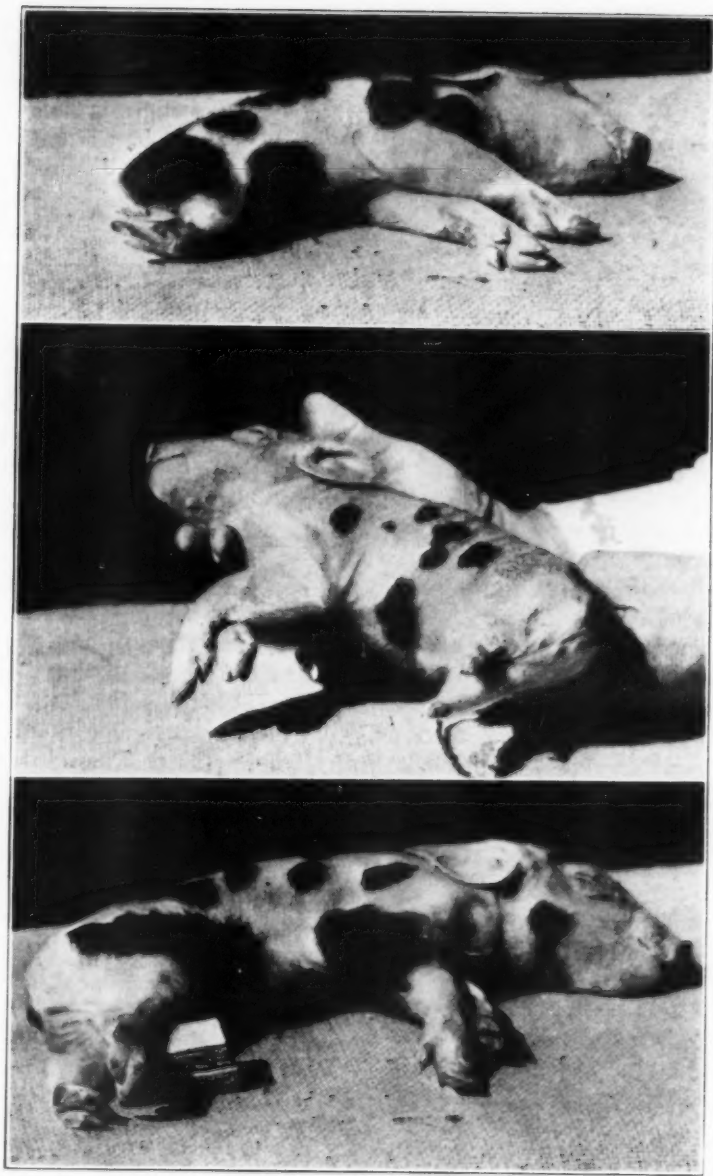


FIG. 2. Photographs of abnormal pigs taken 24 hours after birth. Pigs A, B, C, numbering from top.

to the left at right angles to the spinal column. The hind legs were developed perfectly to the ankles. Below the ankle in the left leg were two large, one medium-sized and one small projection which appeared similar to fingers with pointed claws like those of a dog, on the end. The right hind leg was shorter than the other leg from the hock to the ankle. On it were three finger-like projections pointing at a right angle toward the left foot. There was a small bony growth on the outside of this leg above the ankle about one-third of the distance from it to the hock. This osseous growth was not covered with skin.

#### DISCUSSION

The reasons for such abnormalities are not clear. That this condition is hereditary seems unlikely because the case reported by the English workers was the result of mating two purebred Berkshires and those at this station were cross-bred pigs, out of a purebred Poland China sow and sired by a purebred Duroc-Jersey boar.

An analysis of the diets fed both sows suggests a possible deficiency of vitamins A and G. Excluding the small amount of cod-liver oil given to the sow at this station, the diet is deficient in vitamin A. Barley<sup>3</sup> has been shown to be exceedingly low in this factor and casein likewise added little or no vitamin A to the ration. The vitamin A requirements for the pig during rapid growth and gestation are not known. Taking the requirements of the rat for this factor as a guide, it is conceivable that the amount of this vitamin in the diet was below that needed for normal functioning of this growing, gestating animal. The energy, protein, calcium and phosphorus content of the ration, while probably not optimum, appear sufficient. Rickets does not seem to be a causative agency because bones of three abnormal pigs showed 58.00, 53.98 and 55.93 per cent of ash, while those of two normal pigs of similar ages were 64.80 and 65.25. The average calcium and phosphorus contents of the ash of bones of normal pigs were 37.15 and 15.50 per cent, and for those of abnormal pigs 36.87 and 16.63 per cent. It is true that the percentages of ash of the bones of the normal pigs were higher. However, those of the abnormal pigs were not low.

It is known that a lack of certain nutrients or accessory factors during gestation may result in a defective fetus. Therefore, a deficiency in the diet of the mother might be the causative agent for this or similar abnormalities.

These cases are presented and discussed, briefly, with the hope that others already have seen or in the future may see

similar imperfections and that additional information may be added to our meager knowledge of the causes of such unusual defects.

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<sup>3</sup>Hughes, E. H.: Vitamin A content of barley. *Jour. Agr. Res.*, xlvii (1933), pp. 487-494.

## EXPLORATORY LAPAROTOMY\*

By L. R. BARTO, *Summit, N. J.*

It is rather rare that the after-effects of an oöphorectomy are unfavorable, but when it does happen the situation is likely to be very embarrassing. Therefore, the writer wishes to report this case for the possible benefit that may be derived.

*Subject:* American bull terrier, female, 14 months old.

*History:* A reliable veterinarian performed on oöpho-hysterectomy on this bitch, March 26, 1933. On May 21, 1933, she showed signs of estrum. Again, on December 6, 1933, she was brought to our hospital with signs of estrum, having the normal swelling, menstrual flow and attitude of a female in heat, which lasted the usual full three weeks. A consultation was held with the veterinarian who performed the operation. He decided that, at the cessation of the period, an exploratory laparotomy should be performed, but desired that we do it in order that the client would be more satisfied.

*Preparation:* On January 16, 1934, the animal was brought to the hospital for operation. She was starved for 36 hours. During this starvation period, two enemas were administered at 12-hour intervals.

*Operation:* A well-marked scar resulting from the previous operation was evident midway between the umbilicus and the pelvic inlet. The incision was made directly over and anterior to the umbilicus, since we anticipated remnants of ovarian tissue and that would give us a direct view. In the lumbar region on the right side, a lump of tissue one-half inch in diameter was observed. This was tied off with catgut and removed. A similar piece of tissue was removed from the left lumbar region. This tissue was sectioned by Dr. G. W. Disbrow, of Overlook Hospital, Summit, N. J., who pronounced it ovarian.

\*Received for publication, May 7, 1934.

*Discussion:* Probably every veterinarian will recall that he has more difficulty bringing the ovary through the incision in the collie, American bull terrier and pointer than in most any other breed, because the broad ligament is unusually short and thick. As a result, we either work blindly through the incision or apply so much tension that the ovary is torn, leaving some ovarian tissue behind the ligature or in the teeth of the emasculator if the latter is used. Hormone secretion from this remnant\* will produce estrum. Either a large incision well forward for an oöpho-hysterectomy or a small incision directly over the region of the ovary (umbilical region or beneath the fourth lumbar vertebra) doing a simple oöphorectomy with a spaying hook will guard against later embarrassment in these breeds.

\*For details, see French's "Surgery of the Dog."

### MULTIPLE ADENOMATA IN THE FOURTH STOMACH OF SHEEP\*

By GERARD DIKMANS, Washington, D. C.

*Zoölogical Division, U. S. Bureau of Animal Industry*

Zietschmann<sup>1</sup> described as adenomata certain whitish pea-sized nodules found in the fourth stomach of an apparently healthy sheep which had been submitted to the Institute of Dresden for examination. Feldman,<sup>2</sup> discussing adenomata in domestic animals, mentions Zietschmann's report but records no additional cases. The condition appears, therefore, to be relatively rare or at least has not been observed with any degree of frequency.

The Zoölogical Division has occasion to examine yearly some 200 to 300 sheep shipped from various field stations of the Animal Husbandry Division to Beltsville, Md., for slaughter. During the last two years, three cases similar to that illustrated by the accompanying photograph (fig. 1) have been encountered. These cases all occurred in two groups of sheep, totaling approximately 400 animals, originating at the U. S. Sheep Experiment Station, Dubois, Idaho, which had been lot-fed from about October 10 to December 29, 1933, at Purdue, Ind.

In the case shown in figure 1, the nodules are separate, rounded, from 3 to 5 mm in diameter and from 1 to 2 mm high. The area involved is about 225 square centimeters (36 square inches). Microscopically, the nodules are seen to consist almost entirely of glandular tissue similar in structure to the glandular

\*Received for publication, April 2, 1934.

tissue of the normal mucous membrane of the fourth stomach. The cells appear mature, no mitotic division being noted. The



FIG. 1. Fourth stomach of sheep showing multiple adenomata.

hyperplasia is confined to the mucous membrane, and other parts of the wall of the stomach are not involved.

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<sup>1</sup>Zietschmann, H.: Multiple Labmagengeschwülste des Schafes. Bericht über das Veterinärwesen im Königreich Sachsen für das Jahr 1908. Jahrgang, lili (1909), p. 73.

<sup>2</sup>Feldman, W. H.: Neoplasms of Domesticated Animals. (W. B. Saunders Co., Philadelphia, 1932.)

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Labor to keep alive in your breast that little spark of celestial fire—conscience.—GEORGE WASHINGTON.

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A man used to vicissitudes is not easily dejected.—SAMUEL JOHNSON.

# ABSTRACTS



OM YMPNING MOT DIPLOKOCKJUVERINFLAMMATION HOS KO (On Vaccination Against Diplococcus Inflammation of the Udder in a Cow). Kjellåke Tullberg. Skand. Vet.-Tids., xxii (1932), pp. 302-319.

1. Vaccination with a vaccine, avirulent for mice, and prepared from diplococci producing inflammation in the udder of a cow, proved, on experiment, to be without practical importance as a remedy against the disease.

2. Vaccination with a vaccine, virulent for mice, and prepared from diplococci producing inflammation in the udder of a cow, proved, on experiment, not to possess any curative value, but to constitute a by no means unimportant prophylactic.

3. The said vaccination, with 1 cc of diplococcus vaccine injected into the dewlap of a cow, appeared to be perfectly innocuous.

K. T.

IMMUNISERINGSFÖRSÖK PÅ SVIN MED RODSJUKEYMPÄMNE (Immunizing Experiments on Swine, with Swine-Erysipelas Vaccine). Ake Nordberg. Skand. Vet.-Tids., xxi (1931), pp. 354-359.

Three pigs, each weighing an average of 25 kg, were inoculated subcutaneously, each being given 10 cc of a bouillon culture 24 hours old, of a swine-erysipelas vaccine perfectly avirulent for mice, but immunizing them.

Immediately after the inoculation, and also one, two, three and four weeks after the operation, blood-samples were taken from each pig, and serum from each of these blood-samples was injected separately into mice, in doses of 0.02 cc per mouse. The day following the injection, the mice were infected with virulent swine-erysipelas bacilli, in order to test the immunizing value of the serum.

During the course of the experiments, no sign of the formation of immunizing bodies was observed in any of the sera investigated.

A. N.

DEN KURATIVA SERUMDOSENS STORLEK I FÖRHÅLLÁNDE TILL DEN SKYDDANDE SERUMDOSEN. FÖRSÖK MED RÖDSJUKESERUM PÅ MUS (The Amount of the Curative Dose of Serum in Proportion to the Prophylactic Dose. Experimental Trials with Swine-Erysipelas Serum on Mice). Torsten Blom. Skand. Vet.-Tids., xxii (1932), pp. 104-110.

The curative dose of serum should be greater than the smallest effective prophylactic dose, at least when it is a question of mice and when the infective material is the bacillus of swine erysipelas.

The investigation speaks in favor of (1) the curative dose being at least twice as large as the smallest effective prophylactic dose, and (2) an early and properly proportioned curative dose being able to increase the power of resistance of the animal quite as much as a suitable dose the day before infection.

T. B.

EXPERIMENTELL BESTÄMNING AV RÖDSJUKESERUMETS SKYDDSDOS FÖR SVIN (Experimental Determination of the Protective Dose of Swine-Erysipelas Serum for Pigs). Per Viridén. Skand. Vet.-Tids., xxii (1932), pp. 589-600.

The author points out that it is impossible to provoke a constant mortal issue of the infectious disease by infecting pigs with swine-erysipelas bacilli. Consequently, he considers that the spontaneous occurrence of mortal swine-erysipelas bacillus infection in pigs is a secondary affection, a complication of a primary sickness, the result of which has been a diminution of the natural power of resistance of pigs against swine-erysipelas infection.

In pigs that have been artificially infected with virulent swine erysipelas bacilli, the author has provoked a mortal swine-erysipelas infection by means of a large dose of carbolyzed horse-serum injected into the blood. In this way, he has determined the amount of the protective dose of swine-erysipelas serum in the treatment of pigs. By this experiment, he found that 2 cc of a good swine-erysipelas serum is a sufficiently large dose to protect an animal against infection with swine-erysipelas bacilli. He also found, however, that the swine-erysipelas serum was not always able to protect the animal. In one-third of the cases, no protective effect was observed when the swine-erysipelas serum was used, this being the case whether the dose was 2, 5 or 10 cc.

P. V.

NÖTKREATURSTUBERKULOSENS UTBREDNING I SVERIGES SKILDA LÄN ÅREN 1929, 1930 OCH 1931 BEDÖMD MED HJÄLP AV TUBERKULOSPROCENTEN FUNNEN VID KÖTTBESIKTNING AV KÖTT AV VUXNA NÖTKREATUR VID RIKETS SAMTLIGA KÖTTBESIKTNINGSANSTÄLTER (The Extension of Tuberculosis in Cattle in the Various Government Districts of Sweden During the Years 1929, 1930 and 1931, as Determined by the Percentage of Tuberculosis Discovered on the Examination of the Meat of Adult Cattle at the Various Meat-Inspection Stations of the Country). S. Wall and Iwar Dunér. Skand. Vet.-Tids., xxiii (1933), pp. 19-56.

The authors give a tabular review of the variations in the percentage of tuberculosis among the adult cattle in the various government districts of Sweden during the years 1929, 1930 and 1931.

In most of the provinces, the figures show a tendency to increase. This may signify that the disease is spreading, but it may also mean that the campaign against tuberculosis during the last few years has been carried on more systematically, with a resultant increased slaughtering of tuberculous animals. This latter deduction is based on the fact that the statistics have been derived exclusively from slaughtered animals.

S. W. and I. D.

KVARKSERUMETS SKYDDSVÄRDE PRÖVAT PÅ HÄST MED EFTERFÖLJANDE INFEKTION MED KVARKSTREPTOKOCKER (The Protective Value of Strangles Serum Tested on Horses). Torsten Blom. Skand. Vet.-Tids., xxii (1932), pp. 522-539.

The test carried out supports the theory that a well-prepared strangles serum in suitable doses offers very good protection against the disease. The dose, 100 cc injected intravenously, as a prophylactic, is too large, however; the serum on the first day acts like a *poison*, and this to such a degree that the protective value of the serum, practically speaking, is altogether counteracted.

The serum-dose, consequently, must be smaller than that stated above. For the present, and until the question has been decided experimentally, we may be allowed to suppose that the protective dose should not exceed 50 cc. The effect of the serum at its greatest potency displayed itself as a doubling of the natural protective power of the horse against the disease. This action was observed four days after treatment with serum. The action of the serum then diminished.

Seven days after injection with the serum, the effect of the serum was only half as great as it was four days after the treatment, and ten days after injection, the action was only one-fourth as great as it was four days after treatment.

T. B.

EXPERIMENTELL PRÖVNING AV B.C.G.-YMPÄMNETS IMMUNISERANDE FÖRMÅGA (Experimental Tests of the Immunizing Power of B.C.G. Vaccine). Harry Hedstrom. Skand. Vet.-Tids., xxii (1932), pp. 570-588.

Of 24 guinea pigs inoculated intramuscularly with B.C.G. vaccine, in doses of 1-10 mg of dried bacilli per animal, there have been examined, with section, two animals about four weeks after inoculation, two about six weeks, and the 20 others more than three months. Of these, no more than three displayed any signs of tuberculosis.

Of these three animals: One showed local tuberculosis, with caseation in the lymph-gland corresponding to the place inoculated; one showed well-limited epithelioid tubercles in the spleen, without either giant-cells or caseation; one animal, which died of diplococcus infection one year after inoculation, displayed generalized, limited tuberculosis with encapsulated caseous foci, localized to the lungs, liver and spleen.

The results of the inoculation point to the fact that, even if there is not a total absence of virulence in B.C.G. vaccine as regards guinea pigs, still the virulence is so slight that it is without any practical importance. Only under special circumstances does the B.C.G. vaccine appear to be able to bring about tuberculous processes in the guinea pig (three cases out of 24, or 12.5 per cent). Only seldom (one case out of 24, or 4 per cent) do these tuberculous processes attain any great extension. In all instances, the tuberculous processes observed displayed a distinct tendency toward healing.

B.C.G. vaccine, in doses of 1 cc per animal, of a 0.4 volume-percentage bacillus-emulsion, injected subcutaneously, doubled the resistance of guinea pigs against an infection carried out one or two months after inoculation; the infection was made with virulent tubercle bacilli which killed five untreated control guinea pigs within, on an average, two months after infection. The vaccine, consequently, is able to increase the power of resistance of guinea pigs against a subsequent infection with tubercle bacilli.

B.C.G. vaccine, in doses of 15 cc per animal, of a 0.1 volume-percentage bacillus-emulsion, injected subcutaneously, doubled the

power of resistance of cattle against an infection carried out 2½ months after inoculation, the infection being made with virulent tubercle bacilli which killed two untreated control animals within, on an average, one month after infection. The vaccine, therefore, is able to increase the power of resistance of cattle against a subsequent infection with tubercle bacilli.

H. H.

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STUDIES ON BOVINE MASTITIS. VIII. THE CONTROL OF CHRONIC STREPTOCOCCUS MASTITIS. F. C. Minett, A. W. Stableforth and S. J. Edwards. *Jour. Comp. Path. & Therap.*, xlv (1933), 3, pp. 131-138.

Observations lasting for five years were made in a self-contained herd consisting of 53 cows and heifers, of which, at the beginning, ten were affected with chronic streptococcus mastitis. Preventive measures, which merely involved the milking of infected cows last, led to the formation of a group of cows which for three and one-half years have remained free from the streptococci which cause the chronic and contagious form of mastitis. During this time, five of the originally infected cows recovered completely. This appears to be the first time that it has been proved conclusively, by frequent and searching tests of the milk, that a herd of cows can be maintained free from infection. This constitutes the final proof that chronic streptococcus mastitis is a contagious disease and, therefore, theoretically preventable.

F. C. M.

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PHTHISIS PULMONALIS DUE TO THE BOVINE TYPE OF TUBERCLE BACILLUS. A. Stanley Griffith and W. T. Munro. *Lancet*, Feb. 25, 1933.

An account of ten new Scottish cases is given. Until within the last ten years, the bovine tubercle bacillus, although appearing often in non-pulmonary forms, had very rarely been found in cases of phthisis pulmonalis, probably due to the fact that so few cases of this form had been examined bacteriologically. In Scotland and England, 45 cases have been discovered during the past ten years. From a comparison of the findings in different parts of the country, phthisis, due to the bovine bacillus, varies with the amount of infection in the cattle.

Ages, when bovine bacillus was found in the sputum, varied from seven to 59, by far the larger number occurring between the ages of 20 and 29. There were almost twice as many females as males. Twenty out of 49 patients gave histories of enlarged

glands in the neck or abdominal trouble previous to the onset of phthisis pulmonalis. As far as it has been possible to ascertain, no case has transmitted the infection to another human being. The bovine tubercle is a more frequent cause of phthisis pulmonalis in Great Britain than generally supposed, being often a late manifestation of an infection acquired in childhood through the alimentary tract.

T. O. B.

BOVINE COCCIDIA CARRIERS. Louis V. Skidmore. Jour. Parasitol., xx (1933), 2, p. 126.

From 1925 to 1931, inclusive, 23 severe cases of coccidiosis occurred in bovines varying in age from six days to two years in a dairy herd averaging a total of 125 animals per year. Coccidiosis was observed in every month of the year with the exceptions of January and October. Coccidiosis occurred every year except in 1929. In 1928 and 1929, examination of the feces of older bovines was made to determine the presence of coccidia. On December 31, 1928, the feces of 31 apparently healthy cattle, two to seven years old, showed 40 per cent carriers. Most of the carriers were more than three years old. Of 26 animals, varying from a few days to seven months of age, 11.5 per cent were carriers. On July 7, 1929, examinations of 31 bovines showed 32.2 per cent carriers. Here 40 per cent of the carriers were four to nine years old. On December 12, 1929, examination of the feces from 41 cattle revealed that 9.7 per cent were carriers. The three examinations showed that the same animals were not always carriers. In most instances, different animals proved to be carriers upon each examination. Not any of the carriers showed clinical symptoms of coccidiosis. The voluminous amount of feces to examine and the different periods of development of coccidia in bovines will account for variable results. Likewise, continuous reinfection and intermittent infection with coccidia vary the findings so that it is impossible to state that cattle once found to be carriers are always carriers (chronic carriers). *Eimeria zurnii*, *E. cylindrica* and *E. smithi* were found.

L. V. S.

There is endless merit in a man's knowing when to have done.  
—THOMAS CARLYLE.

**12th International Veterinary Congress**  
**New York—August 13-18, 1934**

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### Washington Tuberculosis-Free

In eradicating bovine tuberculosis from its cattle, Washington becomes the fourteenth state to be designated as a modified accredited area by the U. S. Department of Agriculture. This designation was effective May 1, 1934.

Tuberculosis-eradication work has been in progress in Washington since 1918. The first county in the State to become a modified accredited area was Wahkiakum, which was so declared on November 1, 1927. The remaining 38 counties have been accredited at various intervals since that time. Approximately 2,000,000 tuberculin tests have been applied to cattle since the work was begun in the State.

Wyoming also has made a start toward joining the tuberculosis-free states. Lincoln County has been recognized by the U. S. Department of Agriculture as a modified accredited area. It is the first county of the State to win this distinction.

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### Receives Eagle Scout Rank

Warren Kellogg, 13-year-old son of Dr. and Mrs. L. W. Kellogg, of Anamosa, Iowa, was awarded Eagle Scout rank at the April Boy Scout Court of Honor for the Cedar Rapids Area Council. Young Kellogg is patrol leader of Beaver Patrol, Troop 31, of Anamosa.

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### It Is, at That

Teacher: Can any member of the class tell me what a groundhog is?

Carl (aged six): Please, teacher, it's a sausage.

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*12th International Veterinary Congress  
New York—August 13-18, 1934*



## Regular Army

Captain Stanley M. Nevin is relieved from further assignment and duty at Fort Riley, Kan., effective in time to proceed to Fort Mason, Calif., and report not later than May 31, 1934, to the commanding general, San Francisco port of embarkation, for duty.

Major John R. Ludwigs, having been found by an Army retiring board incapacitated for active service on account of disability incident thereto, and such finding having been approved by the President, the retirement of Major Ludwigs from active service on March 31, 1934, is announced.

Colonel Burt English is relieved from further assignment and duty at Fort Sill, Okla., effective in time to proceed to Fort Bliss, Texas, and report not later than May 31, 1934, for duty.

Major Robert P. McComb, Fort Logan, Colo., has been directed to proceed to his home on or about April 23, 1934, and await retirement.

Major Edward M. Curley is relieved from assignment and duty at Fort Bliss, Texas, effective in time for him to proceed to San Francisco, Calif., and sail on the transport scheduled to leave that port on or about June 19, 1934, for New York City and upon arrival will proceed to West Point, N. Y., and report to the Superintendent U. S. Military Academy for assignment to duty.

Each of the following-named officers of the Veterinary Corps is relieved from assignment and duty as specified after his name, effective in time to proceed to San Francisco, Calif., and sail on transport scheduled to leave that port for New York, N. Y., on or about July 24, 1934; upon arrival in New York will proceed to Washington, D. C., and report to the commanding officer, Army Medical Center, for duty for the purpose of pursuing a course of instruction at the Army Veterinary School.

Colonel James R. Shand, Fort Lewis, Wash.

Lt. Colonel Daniel B. Leininger, Presidio of Monterey, Calif.

Major Joseph F. Crosby, China, is assigned to duty at Fort Devens, Mass., effective upon completion of his present tour of foreign service.

Major Wm. H. Dean is relieved from further assignment and duty at Front Royal quartermaster depot, Front Royal, Va., effective in time to proceed to New York, N. Y., and sail on transport scheduled to leave that port on or about August 21, 1934, for the Philippine Department. Upon arrival he will report to the commanding general for assignment to duty in China.

## Veterinary Reserve Corps

### *New Acceptances*

Angerer, Wm. Joseph....2nd Lt....Atkinson, Ill.

Barber, Clifford Warren.2nd Lt....309 E. Upland Rd., Ithaca, N. Y.

Butler, Homer Clayton...1st Lt....Lock Box 456, Madelia, Minn.

Morton, John Denman...2nd Lt....Callender, Iowa.

### *Promotions*

#### *To*

Williams, Clarence Virgil.Major.....170 W. Page St., Saint Paul, Minn.

### *Transferred from Cav.-Res. to Vet.-Res.*

Wilder, Claude Otto.....2nd Lt....Sylvania, Ga.

## TWELFTH INTERNATIONAL VETERINARY CONGRESS

Waldorf-Astoria Hotel, New York, N. Y.  
August 13-18, 1934

### OFFICERS

*Chairman of the Organizing Committee:* Dr. A. Eichhorn.

*Vice-Chairman:* Dr. L. A. Merillat.

*Treasurer:* Dr. John R. Mohler.

*General Secretary* (to whom all communications should be addressed):

Dr. H. Preston Hoskins, 221 N. La Salle St., Chicago, Ill.

### Membership Campaign

The outstanding event of the past month was the spurt made by New York, which resulted in more than doubling the number of members previously credited to the Empire State. The figures for the report this month were compiled on May 21, so that the gains credited to the various states represent the efforts of just four weeks. After enjoying first place for one month, California was forced into second position by New York. These two states now hold the distinction of being the only ones with more than 100 members enrolled. Illinois, Ohio, Pennsylvania, Minnesota, Massachusetts and Colorado remain in the same relative positions of one month ago, although each state made some gains, with Minnesota showing the most. Missouri and the District of Columbia traded positions as a result of the renewal of the campaign in Missouri. New Jersey got busy and appears in the standing this month for the first time, having displaced New Hampshire from twelfth place. In previous months, the twelve leading states have been listed, but this month the roster is being extended to include the 22 leaders, there being a three-cornered tie for 20th position. The standing follows:

New York .....	145	Oklahoma .....	25
California .....	102	Kansas .....	21
Illinois .....	63	New Hampshire .....	21
Ohio .....	55	Connecticut .....	20
Pennsylvania .....	54	Wisconsin .....	20
Minnesota .....	49	Maryland .....	17
Massachusetts .....	40	Michigan .....	16
Colorado .....	38	Iowa .....	14
Missouri .....	37	Indiana .....	12
District of Columbia.....	34	Oregon .....	12
New Jersey .....	30	Texas .....	12

Among the foreign countries, Germany and Great Britain and Northern Ireland supplied the good news of the month. One mail brought 70 memberships from Germany, and 43 members have been enrolled from Great Britain and Northern Ireland. Canada is now in third place and Japan has dropped to fourth position in the membership standing. The Irish Free State shows for the first time this month with three members.

Germany .....	70	Spain .....	9
Great Britain and Northern Ireland .....	43	Union of South Africa.....	8
Canada .....	15	Sweden .....	6
Japan .....	13	Switzerland .....	5
Egypt .....	11	Irish Free State.....	3

In addition to the countries shown in the above list, members have been enrolled from 18 other countries.

### Finances

With five additional contributions, totaling more than \$1,000, received from veterinary organizations during the past month, the amount that has been set arbitrarily as the quota for the associations is now well on toward its goal. Pennsylvania has the honor of being the largest contributor in this month's group, with Connecticut second on the list.

Contributors during the past month are:

Connecticut Veterinary Medical Association.....	\$ 278
Long Island Veterinary Medical Association.....	100
Maryland State Veterinary Medical Association.....	134
North Carolina State Veterinary Medical Association.....	25
Pennsylvania State Veterinary Medical Association.....	500
South Carolina Association of Veterinarians.....	50
Previously acknowledged .....	5,247

\$6,334

### Honor Roll

One more name has been added to the list of veterinarians who have contributed the sum of \$100 toward the Congress, Dr. Christian Rothang, of Sea Cliff, N. Y., bringing the total number of members on the honor roll to 23.

### Program

Since the publication of the Preliminary Program, word has been received from Dr. H. Carré, of Alfort, France, to the effect that he would be unable to contribute a report on foot-and-mouth disease. Dr. W. Guzek, of Krakow, Poland, declined the invitation to contribute a report on fowl-pox, and Dr. J. E. Richelet,

of Buenos Aires, Argentina, has found it impossible to present a report on the unification of the methods of meat inspection. The death of Prof. Charles Porcher, reported in the February issue of the JOURNAL, removed an outstanding figure from the program of the Congress.

Instead of four reports on infectious mastitis, there will be five, the additional report to be contributed by Drs. F. S. Jones and R. B. Little, of the Rockefeller Institute, Princeton, N. J.

### Congress Notes

Dr. C. D. McGilvray, principal of the Ontario Veterinary College, Guelph, Ontario, will represent his institution at the Congress.

Prof. J. Basil Buxton, who will be a reporter on tuberculosis, has been appointed the official delegate from the University of Cambridge, Cambridge, England.

Dr. Thomas W. M. Cameron, who will report on immunity against parasites, will officially represent the Institute of Parasitology of McGill University, Montreal, Quebec, Canada.

Prof. Dr. S. Schermer, who will report on the blood-group question, will also be the official delegate of his institution, the University of Göttingen, Germany.

Dr. R. R. Birch has been designated as the official delegate for the New York State Veterinary College at Cornell University, Ithaca, N. Y.

Prof. Gerh. Forssell, president of the Association of Swedish Veterinary Surgeons, will officially represent his national group at the Congress. Mrs. Forssell, who will accompany Prof. Forssell to New York, had the honor of being the second lady member of the Congress to be enrolled.

Dr. J. F. Shigley will attend the Congress as the official delegate of the Pennsylvania State College, State College, Pa.

The eleven veterinarians of the Bureau of Agricultural Economics, U. S. Department of Agriculture, under the directorship of Dr. L. D. Ives, have filed their applications for membership in the Congress, thus giving the B. A. E. a 100 per cent membership rating.

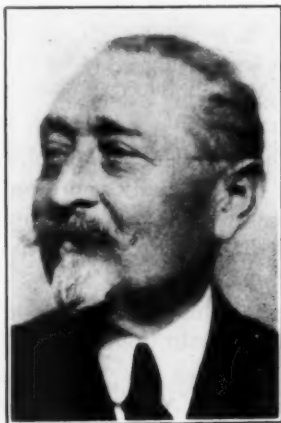
May 12 was an eventful day in the office of the General Secretary of the Congress, for it was on that date that the 1,000th application for membership in the Congress was received, the honor going to Dr. William Madson (Chi. '11), of Appleton, Wis.

New York also had cause for celebration on that day, when the 100th application for membership was filed from that State, with Dr. Samuel M. Apfelberg (N. Y.-Amer. '13) City Veterinarian of Yonkers, adding the third digit to the number already on file from the Empire State.

The Organizing Committee of the Eleventh International Veterinary Congress still has on hand some sets of the Proceedings of the Eleventh Congress. It is willing to sell these for \$5 a set (three volumes)—a bargain for those who neglected to get their copies four years ago. Those interested in this offer should write to Dr. Fred Bullock, 10 Red Lion Square, London, W. C. 1, England, or to Dr. H. Preston Hoskins, 221 N. La Salle St., Chicago, Ill.

### Dr. Guérin to Report on BCG

Dr. Camille Guérin, Chief of Veterinary Service at the Pasteur Institute in Paris, will contribute a report to the Congress on "The Prophylaxis of Bovine Tuberculosis." This will be received with a great deal of interest, owing to the fact that the Calmette-Guérin method of vaccination has been the subject of much controversy in scientific circles during the past decade. Dr.



DR. CAMILLE GUERIN

Guérin was a pupil of Professor Nocard at Alfort. Since 1897, he has been on the staff of the Pasteur Institute and for some time has devoted a large part of his time to the study of tuberculosis.

The well-known designation BCG is derived from "Bacille Calmette-Guérin."

## COMMENCEMENTS

### ONTARIO VETERINARY COLLEGE

Twenty-three candidates received the degree of Bachelor of Veterinary Science at the Convocation of the University of Toronto, May 3, 1934. They are:

A. W. Allan	G. H. Keown
A. J. Bonaci	R. J. McClenaghan
F. H. Conover	C. A. Moore
I. McD. Cruikshank	R. D. Mutrie
T. A. des Iles	W. McC. Norton
C. C. Fleming	F. G. Oakes
E. N. Harrop	J. N. Perry
D. S. Hasson	W. H. Phillipsen
J. O. Heishman	F. Phillips
J. W. Higginson	G. D. Pinder
T. L. Jones	G. F. O. Sharpe

L. C. Swan

Honors were awarded to members of the graduating class as follows:

#### *Honor Standing—Written Examinations*

Gold Medal for highest aggregate standing—G. D. Pinder, of Wakefield, England.

Second Prize—T. L. Jones, of Mold, North Wales.

Third Prize—G. H. Keown, of Victoria, B. C.

#### *Andrew Smith Memorial Medal*

J. O. Heishman, of Wardensville, W. Va.

#### *Helen Duncan McGilvray Prize*

T. L. Jones, of Mold, North Wales

#### *Canadian Army Veterinary Corps Prize*

E. N. Harrop, of Acton, Ont.

#### *Clinical Practice Prize*

J. N. Perry, of Blackfolds, Alta.

#### *Bacteriology, Special Prize*

T. L. Jones, of Mold, North Wales

### K. S. C. Prizes

The eleventh annual Recognition Day program of the Kansas State College took place in the College Auditorium, Manhattan, May 4, 1934. On this occasion, all winners of student prizes in the College received their awards. Because of the comparatively large number of students in the Division of Veterinary Medicine, and because the scholarship standing appears to be higher during this school-year than it has been for a long time, scholastic honors have been awarded to more than the average number of

students in veterinary medicine. The names of the prize-winners are as follows:

*General Proficiency*

Prizes offered by Dr. E. A. Schmoker (K. S. C. '17), of Seattle, Wash.

First Prize (\$10).....Bradbury Bedell Coale, '34

Second Prize (\$5).....Carl William Schulz, '34

*Therapeutics*

Prizes offered by Dr. C. E. Salsbery (K. C. V. C. '11), of Kansas City, Mo.

\*First Prize (\$5).....Oscar Frederic Fischer, '35

\*First Prize (\$5).....Donald Clifford Kelley, '35

\*Second Prize (\$2.50).....Herbert Henry Fechner, '35

\*Second Prize (\$2.50).....Joseph F. Knappenberger, '35

*Pathology*

Prizes offered by Dr. O. M. Franklin (K. S. C. '12), of Amarillo, Tex.

First Prize (\$10).....Robert Louis Anderes, '34

Second Prize (\$5).....Bradbury Bedell Coale, '34

*Physiology*

Prizes offered by Dr. N. D. Harwood (K. S. C. '18), of Manhattan, Kan.

First Prize (\$10).....Marvin John Twiehaus, '36

Second Prize (\$5).....Keith Obed Lassen, '36

The honor of being the first student in veterinary medicine at Kansas State College to be elected to the Society of the Sigma Xi, national honor society of research workers, goes to Bradbury Bedell Coale. Elected to Phi Kappa Phi, honor society at the College, are: Bradbury Bedell Coale, Carl William Schulz, Robert Louis Anderes and Paul E. Chleboun. Gamma Sigma Delta, honor society in agriculture and related sciences, has chosen: Bradbury Bedell Coale, Carl William Schulz, Robert Louis Anderes, Paul E. Chleboun, Ray C. Jensen and Clarence C. Merri-man. A. E. White, Jr., and Lillis Wimpe were elected to Scabbard and Blade, and Dr. Herman Farley (K. S. C. '26) is a candidate for the Master's Degree with the highest scholastic average.

\*Prizes divided.

### Copper Containers for Cut Flowers

The life span of cut flowers can be lengthened by keeping them in copper containers, according to Mr. John Ratsek, floriculturist at the New York State College of Agriculture. Tests show that some of the copper, from the plated containers used in the experiment, dissolved in the water, and thus kept the water purer by hindering the growth of bacteria and other organisms that cause flowers to decay.

## MISCELLANEOUS



### Eastern Iowa Practitioners' Clinic

The Eastern Iowa Veterinary Association has announced plans for its fourth annual Practitioners' Clinic, to be held June 14, at Mechanicsville. Dr. R. M. Hofferd, of Cedar Rapids, is chairman of the Clinic Committee.

The Equine Section will be in charge of Dr. C. H. Banks, of Tipton, and Dr. P. V. Neuzil, of Blairstown. Demonstrations will include the following: artificial insemination; laboratory examination of semen; operation for the relief of roaring; removal of nasal septum; radical operation for puncture wounds of the hoof; Dappen dental extractors; the use of Vollstedt electric cautery on bull's eye shoulders, tumors, etc.; chronic laminitis and navicular disease.

The Cattle Section, under the direction of Dr. C. H. Waite, of Stanwood, and Dr. H. N. Strader, of Marion, will feature: spaying of heifers; painless, bloodless dehorning; restraint; removal of retained placenta; teat operations; castration of cryptorchid bull.

The Swine Section, under the direction of Dr. F. J. Crow, of Iowa City, and Dr. I. W. Moranville, of Durant, will have the following: spaying of gilts; laboratory examination of semen; restraint of boar.

The Sheep Section will be directed by Dr. E. A. Horner and Dr. W. L. Andrews, of Brighton.

The Poultry Section, under the direction of Dr. C. L. Moles, of Dike, and Dr. V. B. Vanderloo, of Dubuque, will include: caponizing; rapid methods of pullorum disease testing; practitioner demonstrations of oöcysts of coccidiosis by microscope.

The Small-Animal Section, under the direction of Dr. D. E. Wright, of Cedar Rapids, will provide a subject upon which any requested operation may be performed.

The Laboratory Section will be in charge of: Dr. Frank Breed, of Lincoln, Neb.; Drs. Ashe Lockhart, A. T. Kinsley and C. E. Salsbery, of Kansas City, Mo.; Dr. H. C. Smith, of Fort Dodge, Iowa; Dr. C. D. Lee, of Ames; Drs. T. W. Munce and L. E. Willey, of Sioux City; Dr. J. D. Ray, of Omaha, Neb.

### **"Bill" Graham and the Ontario Veterinary College**

The above refers to William Graham, familiarly known as "Bill," who has reached the allotted span of three score years and ten, and is retiring this month from his duties at the Ontario Veterinary College.

"Bill's" career began during the year 1900, when the late Dr. Andrew Smith engaged him as "handy man" around the old College on Temperance Street, Toronto. Then, when the College was taken over by the government, he moved with it from Toronto to Guelph. Thus, he has 34 years of continuous service to his credit, and throughout these many years has been the personal friend of everyone. Every graduate during this time has retained a kindly feeling for "Bill," and the JOURNAL is pleased to have this opportunity of passing the news of his retirement to graduates of the Ontario Veterinary College all over the world, and to state that a suitable token of appreciation is being arranged for him and Mrs. Graham in the form of a testimonial and gift.

Many O. V. C. graduates will undoubtedly want to share in this kindly act; so, to anyone desirous of so doing, it is suggested that he contribute a small amount of from \$1 to \$2. It is hoped that a good response will be received for this worthy purpose. Each O. V. C. graduate is reminded of the many times that he has answered the inquiry, "Say, Bill, is there any mail for me today?" You may reciprocate by sending something for "Bill" in the mail today.

Contributions may be sent direct to either Dr. W. J. R. Fowler or Dr. C. D. McGilvray, in care of the Ontario Veterinary College, Guelph, Ontario, Canada.

### **Serum Producers on the Air**

The publicity campaign, which was planned and put into effect last year by the Associated Serum Producers, Inc., South Omaha, Neb., was so successful that it is being continued this year on an even larger scale. The publication schedule has been increased to include the Corn Belt dailies: *Kansas City Drovers Telegram*, *Omaha Journal-Stockman*, *Chicago Drovers Journal* and *East Saint Louis Live Stock Reporter*.

Other publications in which advertisements are appearing are: *Successful Farming*; *Farmer, Farm, Stock and Home*; *Dakota Farmer*; *Wallace's Farmer*; *Nebraska Farmer*; *Kansas Farmer*; *Missouri Ruralist*; *Prairie Farmer*; *Indiana Farmers Guide*; *Ohio Farmer*. In addition, radio broadcasts will play an impor-

tant part in disseminating valuable information on the necessity for controlling hog cholera through the administration of preventive products by competent veterinarians.

Broadcasts are given daily, Sundays excepted, over the following stations: WLS (Chicago), immediately following Jim Poole's live stock market report at 12:55 Central Standard Time; KFAB (Lincoln, Neb.), at 12:30 p. m., daily except Tuesday; WHB (Kansas City), at 12:20 p. m.; WNAX (Yankton, S. D.), at 12:20 p. m., in connection with the live stock market reports. The sale of veterinary service is the object of the radio campaign, and it is expected that the veterinary profession will cooperate enthusiastically.

A feature of the broadcasts once each week is the announcement of the sections of the various states in which hog cholera has broken out. Veterinarians knowing of outbreaks of cholera are asked to wire collect to R. J. Potts & Company, advertising representatives of the Associated Serum Producers, Inc., at 101 West 11th Street, Kansas City, Mo. The information will be incorporated into the broadcasts, in the hope that it will be an effective way of arousing the active interest of hog-raisers throughout the country.

### Glanders Appears in Canada

An outbreak of glanders in the province of Quebec, Canada, has resulted in the destruction of 300 horses within the past few months, and is keeping the office of the Veterinary Director General, Dr. George Hilton, busy trying to prevent its spread. Approximately 5,000 horses have been tested with mallein, and the reactors slaughtered. The outbreak, so far, has been confined to the eastern section of the province, with only a few cases detected in Montreal.

Concerning the outbreak, Dr. Hilton writes:

It is unusual, in that there are no clinical cases, and many of the horses have given unsatisfactory reactions. This has caused much difficulty in dealing with the outbreak, and more particularly with horse-owners. I may say, however, that the organism has been isolated from a small nodule taken from the lung of a non-clinical case which gave only a fair reaction curve. The outbreak is an unusual one under present conditions, since glanders has been considered to be practically eradicated.

Because of the highly contagious nature of the disease, the JOURNAL is issuing a warning to veterinarians in other parts of the country to be on their guard against a foe that is supposed to have almost completely disappeared.

### **Rabies in Illinois**

With the discovery of three positive cases of rabies in Williamson County, Illinois, Dr. O. T. Hayer, in charge of rabies control for the Illinois State Department of Agriculture, is urging the citizens in that vicinity to keep their dogs securely tied or well confined. Two other cases were also reported: a dog, from Eldorado, and a cow, from West Frankfort, Ill.

Dog catchers are busy in Danville, Ill., at the request of Dr. W. M. Hooton, city veterinarian, whose orders are that all unlicensed dogs be destroyed, unless their owners obtain licenses for them. Too many stray dogs are at large, Dr. Hooton points out, and they have become a menace to the city.

### **Changes at Colorado**

At the meeting of the Colorado State Board of Agriculture, on May 25, the Veterinary Division of the Colorado Agricultural College was reorganized into four departments. Previously, there had been two departments, one of Veterinary Medicine, of which Dr. George H. Glover was the head, and the other of Pathology and Bacteriology, headed by Dr. I. E. Newsom since 1918. No changes were made in these departments, but Dr. James Farquharson was appointed head of the Department of Veterinary Medicine, to succeed Dr. Glover, and two new departments were created. These are Veterinary Surgery, with Dr. H. E. Kingman as full professor, and Veterinary Physiology, with Dr. R. F. Bourne occupying a similar position.

While Dr. Glover will retire July 1, he will continue to teach two minor subjects and will have the title of Dean of Veterinary Medicine Emeritus. When the reorganization is effected, there will be ten veterinarians on the faculty at Fort Collins. Dr. H. E. Kingman will return from his leave of absence of one year, and Dr. Lester Heath, who has been employed temporarily during the past year, is to remain on the faculty permanently.

### **Iowa Veterinarians to Show Their Horses**

Dr. F. M. Wilson (Chi. '11), of Mechanicsville, Dr. V. G. Bromwell (Iowa '18), of Center Point, and Dr. H. N. Strader (Iowa '20), of Marion, have entered their horses in the Saddle Horse Show, to be held June 10, 1934, at Marion, Iowa. The Show is given by the Marion Post, No. 298, of the American Legion.



## MASSACHUSETTS VETERINARY ASSOCIATION

The regular monthly meeting of the Massachusetts Veterinary Association was held at the Westminster Hotel, Boston, April 25, 1934, with 60 members in attendance.

The meeting was called to order by President E. F. Schroeder, of Arlington. Following a short business session and dinner, the members adjourned to the amphitheater in the Mallory Institute of Pathology, Boston City Hospital. Here they watched Dr. Stephen J. Maddock, director of the surgical research laboratories at the Boston City Hospital, aided by his assistants, perform three operations on a dog that were a revelation in surgical technic. He performed a gastrotomy, a cecectomy and an end-to-end anastomosis of the intestine. Several points of technic were brought out. In suturing the stomach, Dr. Maddock closed with three layers of silk, pointing out that there was greater danger of leakage from the stomach than from an incised gut.

In speaking of end-to-end anastomosis, Dr. Maddock said it was his opinion that this method was to be preferred to side-to-side union, since in his many years of canine surgical experience, he had seen several cases of obstruction appear where the latter method had been used. He also showed lantern-slides and spoke on the importance of blood chemistry as an adjunct to surgical diagnosis and treatment of intestinal obstruction. Experiments on dogs have shown a tremendous reduction of blood chlorids, these being eliminated into the stomach and invariably vomited by the dog soon after the intestinal obstruction. Intravenous normal saline is definitely indicated in these cases.

In closing the abdomen, a feature was the stitching of the properitoneal fat as the first line of suture. This prevents adhesions to the suture line and preserves a tissue, which normally prevents bruising of the abdominal contents in falls, running, etc. The closure was completed by three more layers of fine silk, the final row being a subcuticular stitch. All present derived a great deal of worth-while information from the demonstration, and all enjoyed the privilege of meeting in this fine, modern medical building.

G. B. SCHNELLE, *Reporter.*

### CHICAGO VETERINARY MEDICAL ASSOCIATION

The regular monthly meeting of the Chicago Veterinary Medical Association was held at the Palmer House, March 13, 1934. Meetings are no longer being held at the La Salle Hotel.

The speakers of the evening were Mr. Charles F. Lanwermeier, pharmaceutical chemist, and Dr. E. E. Sweebe, veterinarian, of the Abbott Laboratories, North Chicago, Ill. Mr. Lanwermeier spoke on "The History of the Haliver Oil Industry," and Dr. Sweebe covered "The Application of Haliver Oil for Veterinary Use."

#### APRIL MEETING

At the regular meeting, held April 10, Dr. O. A. Longley, of Los Angeles, Calif., was guest speaker of the evening. His subject was "Newer Conceptions of the Rôle of Vitamin C in the Diet of Dogs and Its Influences on Certain Skin Diseases." Dr. O. Norling-Christensen reported the results of his experiments with the new method of immunization against canine distemper, developed by Dr. George W. Little, of New York, N. Y.

#### MAY MEETING

The regular meeting in May was in the form of the annual banquet, held at the Palmer House, May 15. This was unusual in at least one respect. Following a very fine dinner, Dr. C. N. Bramer, president of the Association, announced that there would be no after-dinner speech making, to the satisfaction of everybody present. In place of the customary addresses, everybody played bridge until after midnight. The members of the committee which planned the banquet and entertainment received much well deserved praise for their efforts in arranging such an enjoyable program for the evening.

O. NORLING-CHRISTENSEN, *Secretary*.

### MAINE VETERINARY MEDICAL ASSOCIATION

The quarterly meeting of the Maine Veterinary Medical Association was held at the University of Maine, Orono, March 29, 1934, in conjunction with Farm and Home Week. Sixteen members and several visitors were present to hear and discuss the following papers: "Bang's Disease," by Dr. P. R. Baird, of Waterville; "Progress in T. B. Eradication," by Dr. J. R. Corliss, of Augusta; "Mastitis Differentiation and Diagnosis," by Dr. M. E. Maddocks, of Augusta.

R. E. LIBBY, *Secretary*.

### MICHIGAN-OHIO VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Michigan-Ohio Veterinary Medical Association was held at Adrian, Mich., April 26, 1934.

Dr. E. K. Sales, secretary of the Michigan State Veterinary Medical Association, and a member of the faculty at Michigan State College, gave two illustrated lectures on "The Breeds of Dogs" and "Canine Parasites and Parasite Eggs." Dr. E. C. W. Schubel, of Blissfield, Mich., gave a paper on "Dispensing by the Veterinarian."

The election of officers resulted in the choice of the same officers who had served during the past year: President, Dr. S. G. Colby, Monroe, Mich.; vice-president, Dr. J. W. Marshall, Genoa, Ohio; secretary-treasurer, Dr. E. C. W. Schubel. A Program Committee was appointed by the President, as follows: Dr. C. W. Wittey, Elmore, Ohio; Dr. J. W. Schneider, Riga, Mich., and Dr. J. W. Marshall.

E. C. W. SCHUBEL, *Secretary.*

### VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was held at the Hotel New Yorker, May 2, 1934. This session marked the fortieth anniversary of the founding of the Association. The attendance was excellent, with 86 members and visitors present.

The guest speaker for the occasion was Dr. William H. Park, noted immunologist, and Director of the Bureau of Laboratories, New York City Department of Health. The title of Dr. Park's paper was "The Relation of Animal Diseases to Public Health." First, he gave a résumé of the various diseases that man can contract from animals, such as tuberculosis, from the cow; glanders, from the horse; rabies, from the dog; tularemia, from wild game; Rocky Mountain spotted fever and foot-and-mouth disease, from deer. Second, he discussed the production of biologics for the control of disease: smallpox vaccine, rabies vaccine, diphtheria toxin-antitoxin, spinal meningitis serum and scarlet fever serum. Dr. Park concluded his paper with a discussion of broncho-pneumonia. He pointed out that there are eight types of pneumonia, but that types I, II and III are most prevalent.

He told how rabbit serum and sputum are used in detecting the type of pneumonia from which a patient is suffering.

Dr. Park has had a long and interesting career. He was one of the first members of the Department of Health in New York City, and has devoted more than forty years toward keeping that metropolis free from disease. Outstanding among his accomplishments was the stamping out of an epidemic of diphtheria that threatened the city a few years ago.

R. S. MACKELLAR, JR., *Secretary.*

### COLORADO VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Colorado Veterinary Medical Association was held at the Colorado Agricultural College, Fort Collins, May 24-25, 1934, with the largest attendance ever recorded for the Association.

The program was outstanding from start to finish. High points of the program were two papers by Dr. C. P. Fitch, president of the American Veterinary Medical Association. The first opened the program and dealt with the control of Bang's disease, and the questions asked and the discussions that followed were enjoyed by every listener. Of special interest was the discussion of the adaptation of a plan of control under range and semi-range conditions. The second was given on the second day, and was entitled, "Results of Recent Researches Conducted at University Farm." In this connection, motion pictures were shown, depicting the results of a certain type of calcium and vitamin deficiency in calves. A discussion of investigations into diseases of moose in northern Minnesota constituted the second part of the paper, while cyanid poisoning caused by feeding Sudan grass, and the use of sodium nitrite intravenously as a means of controlling the effects of the poison, were discussed and pictures shown as a third part.

Other papers on the program the first day included one by Dr. L. C. Butterfield, in charge of meat inspection for the U. S. Bureau of Animal Industry in Denver, on "Meat Inspection, Federal and Municipal," in which the importance of this phase of veterinary work was stressed. Dr. Butterfield pleased his audience with his clear-cut analysis of the situation, and with his presentation of facts concerning the place of the veterinarian in meat-inspection work. He urged that every effort be made to keep this work within the profession, where it rightly belongs.

Dr. A. N. Carroll, of Pueblo, presented a paper on the use of hydrochloric acid intravenously. A review of available literature was given, and suggestions were made as to the possible use that

might be made of this mode of therapy in veterinary medicine. During the discussion that followed, it was brought out that several small-animal practitioners have been using hydrochloric acid successfully in certain types of skin disorders in dogs.

Papers presented on the second day, in addition to that by Dr. Fitch, included one on "Nematode Infestation of the Skin of Cattle," a new piece of work being carried on by Dr. G. W. Stiles, Jr., of the Denver office of the U. S. B. A. I. In this connection, Dr. Stiles presented slides and showed mounted specimens of hides. Many practitioners remembered having seen similar lesions on the ventral, midline surface of cattle.

Dr. L. E. Swanson, of the U. S. B. A. I., Salt Lake City, Utah, presented a paper and motion pictures on "The Liver Fluke Situation in Colorado, and the Control of Liver Flukes in Cattle and Sheep." Dr. Swanson, who is a recognized authority on this subject, had just completed a thorough survey of Colorado, so that the information he presented was greatly appreciated by busy practitioners of the State. Pamphlets distributed at the close of his address gave detailed information about control measures advocated by the Bureau of Animal Industry.

Dr. R. M. Gow, State Veterinarian, of Denver, concluded the literary program with a discussion of "Live Stock Quarantine Regulations and Control of Public Auction Sales." This timely topic was discussed enthusiastically.

The clinic, held on the morning of the first day and the afternoon of the second, was under the direction of Dr. James Farquharson, of the Colorado Agricultural College. While emphasis was placed on equine practice, a number of interesting cases of canine, porcine, ovine and bovine disorders were presented. Of special interest were the fine demonstrations of Dr. Darrell E. Trump, of Utica, Neb. His practical methods of restraint, dosing animals and performing field operations were decidedly popular with the members.

The banquet, held on the evening of the first day, was a tribute to Dean George H. Glover and his fifty years of service since his graduation, in 1884, with the first class to be graduated by the Colorado Agricultural College. As a fitting climax to the delightful occasion, the students and veterinary faculty of the College presented Dean Glover with an easy chair, and 314 veterinary alumni contributed to a fund raised to send him to the Twelfth International Veterinary Congress. Friends to the number of 185 gathered at the banquet table to honor Dean Glover.

JEAN C. FLINT, *Secretary*.

# NECROLOGY



## PATRICK F. WEST

Dr. Patrick F. West, of Chicago, Ill., died in a local hospital, March 5, 1934, a few days after he had entered the institution for a surgical operation.

Born in Chicago, March 17, 1875, he attended local schools and the McKillip Veterinary College. Following his graduation in 1909, he practiced in Chicago for about six years. He then entered the service of the U. S. Bureau of Animal Industry and was assigned to meat inspection in Chicago. He was still engaged in this work up to the time of his fatal illness.

Dr. West joined the A. V. M. A. in 1919. He was a member of the National Association of B. A. I. Veterinarians. He is survived by his widow (née Nora T. Boylain), one son and two daughters.

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## EDMUND ARPIN CHOLVIN

Dr. Edmund A. Cholvin, of Dubuque, Iowa, was fatally injured when he was struck by a hit-and-run motorist while walking on the highway west of Key West, near Dubuque, April 15, 1934. He died while being taken to a hospital.

A graduate of the McKillip Veterinary College, Class of 1913, Dr. Cholvin was a second lieutenant in the Veterinary Corps during the late war. He enlisted on November 14, 1917, and was discharged on April 30, 1919, after having been stationed at Camp Greenleaf, Ga., and Camp Humphreys, Va.

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## CHARLES H. WRIGHT

Dr. Charles H. Wright, of Kansas City, Mo., died at his home, March 27, 1934, following a brief illness due to lobar pneumonia.

Born at La Grange, Mo., March 17, 1873, Dr. Wright moved to Kansas City as a youth. He attended high school and took up the trade of tinsmith. While following this trade, he entered the Kansas City Veterinary College and received his degree in

1908. He served two temporary appointments in the U. S. Bureau of Animal Industry prior to July 22, 1912, when he received a permanent appointment. He was assigned to meat inspection at National Stock Yards, Ill., and later transferred to Kansas City, Kan., where he served continuously until his death.

Dr. Wright joined the A. V. M. A. in 1918, but resigned in 1926. He was a member of the National Association of B. A. I. Veterinarians, and was quite active in Masonic Circles in Kansas City. He is survived by his widow and two sisters.

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### FRANK A. BRITT

Dr. Frank A. Britt, of LaHarpe, Ill., died at his home, May 1, 1934, following a heart attack, the second he had suffered within two weeks.

Born near LaHarpe, September 2, 1884, Dr. Britt attended local county schools and, when the family moved to LaHarpe, he continued through high school and entered Gittings Seminary. Later, he entered the Chicago Veterinary College and was graduated in 1909. With the exception of two years spent in Kansas, and four years in Portland, Ore., Dr. Britt had spent practically all his life in or near LaHarpe.

Dr. Britt was a member of the A. F. & A. M., and of the LaHarpe Chapter, R. A. M. Surviving him are his widow (née Lelah Greer) and three brothers.

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### ROY A. GREGORY

Dr. Roy A. Gregory, of Gaithersburg, Md., died at his home, May 4, 1934. His death was sudden, and occurred while he was amusing his little son in the front yard of his home. The cause of death was given as heart disease.

Born August 14, 1887, at Irving, Illinois, Dr. Gregory attended the elementary schools of that State until 1901, and the elementary and high schools at Gage, Okla., from 1901 to 1905. He then matriculated at Kansas City Veterinary College, and was graduated in 1909. He engaged in private practice until 1915, when he entered the service of the U. S. Bureau of Animal Industry and was assigned to tick eradication in Arkansas. For a brief period, from December 31, 1921, to October 3, 1922, he was not with the B. A. I., but was recalled and assigned to Raleigh, N. C., on tuberculosis eradication. On June 1, 1924, he was transferred to Maryland on a similar project, where he served until his untimely death.

Dr. Gregory joined the A. V. M. A. in 1917. He is survived by his widow, one son and one brother, Dr. Marvin Gregory (K. C. V. C. '04), who is now on tuberculosis eradication in Missouri for the B. A. I.

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### L. M. WEAVER

Dr. L. M. Weaver, colored practitioner, of Ironton, Ohio, died at the Deaconess Hospital, May 9, 1934, from a head bullet wound. Dr. Weaver was 41 years of age. Police officers were in doubt as to whether Dr. Weaver had killed himself, or had been a victim of foul play, since the evidence was conflicting.

Dr. Weaver had practiced in Ironton since his graduation from Ohio State University, in 1915. Recently, he had been elected Humane Officer of Lawrence County. He had conducted an animal hospital for a number of years, and was widely known in and around Ironton. Surviving are his widow, his mother, one brother and one sister.

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### A. E. FLOWERS

Dr. A. E. Flowers, of Dallas, Texas, died at his home, May 18, 1934.

Born at Ridgeway, N. Y., January 3, 1867, Dr. Flowers was a graduate of Yates Academy, Yates, N. Y., and of the Chicago Veterinary College, class of 1895. He and his brother, Dr. G. R. Flowers, who died August 2, 1933, were two of the first graduate veterinarians to enter practice in Texas, and were associated for a number of years in the management of their farm, Flowerdale, south of Dallas. Dr. Flowers was widely known throughout the Southwest as a racing official and as an advocate of cattle improvement. For a number of years, he served as superintendent of racing for the Oklahoma State Fair, at Oklahoma City, and occupied the same position with the State Fair of Texas in the early days of the organization. He also served as general superintendent of the live stock division of the Texas State Fair, and was official veterinarian at the time of his death.

Dr. Flowers joined the A. V. M. A. in 1920. He was a past-president of the State Veterinary Medical Association of Texas. He was also prominent in the affairs of the Texas Breeders' Association and the Texas Jersey Cattle Club, having been president of both organizations. He is survived by his widow, one son, two sisters and two brothers.

M. F.

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**CALVIN C. MONTGOMERY**

Dr. Calvin C. Montgomery, of Lincoln, Ill., died at his home, May 15, 1934, as a result of asthma and complications from which he had suffered for many years.

Born near Middletown, Ill., January 3, 1869, Dr. Montgomery attended local schools and entered the Chicago Veterinary College. He was graduated from the latter institution in 1891, and returned to practice in Middletown. After practicing the veterinary profession for a few years, Dr. Montgomery decided to study human medicine, and entered the Washington University Medical School, at Saint Louis, Mo. Upon his graduation in 1900, he served his internship and located for practice at Lincoln.

Dr. Montgomery served in the Medical Corps during the World War. Later, he was commander of the Lincoln Post of the American Legion and was a past-president of the Logan County Medical Society. Dr. Montgomery was active in Republican politics, and in his youth had served as committeeman from Corwin Township, Ill. Surviving Dr. Montgomery are his widow (née Lucia Rayburn), two daughters and two brothers.

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**FRED SCIDMORE**

Dr. Fred Scidmore, of Dundee, Ill., died at his home, May 22, 1934, after a short illness with heart disease.

Born at Plymouth, Wis., October 4, 1872, Dr. Scidmore was graduated from the Chicago Veterinary College in 1910. Following his graduation, he located at Dundee, and practiced there until his final illness. Surviving Dr. Scidmore are his widow (née Marie Raessler), one daughter, one sister and four brothers.

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**FRANK EUGENE METCALF**

Dr. Frank E. Metcalf, of Elgin, Ill., shot and fatally wounded himself with a revolver, at his home, April 17, 1934. He died the following morning at Saint Joseph's Hospital. He had been despondent over financial worries.

Dr. Metcalf, who was 49 years of age, was a graduate of the McKillip Veterinary College, class of 1912, and had practiced at Momence, Beecher and Geneva, Ill., before going to Elgin. During the World War, he served in the Veterinary Corps of the Army. He enlisted July 24, 1917, as a second lieutenant, and was discharged as a first lieutenant, July 16, 1919, after having been

stationed at Fort Sheridan, Ill., and Camp Taylor, Ky., with the 71st Field Artillery. He is survived by his mother, with whom he made his home.

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### **Respite for Famous Dog**

Dr. Charles W. Bower (K. S. C. '18) of Topeka, Kan., received public notice in the national press recently when he was named to put to death Pal O'Cragman, champion Irish terrier, because it was the wish of the owner of the dog that he follow her in death.

This strange request, made by Mrs. Rolla J. Parker, of Topeka, who felt the dog might fall into unkind hands after her death, stirred the city to the extent that the administrators of the estate ruled that Pal should not die, but should enjoy the pleasures of life in a good home that would be chosen for him.

Pal O'Cragman is six years old and has won 100 blue ribbons in dog shows. He once restored his mistress to consciousness by licking her face when she had fainted.

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### **Buffalo Gnats Kill Live Stock**

Dense swarms of buffalo gnats stopped spring farming in many parts of Arkansas during the latter part of April and killed thousands of dollars worth of live stock, according to news reports. In a ten-mile radius of the Ward community, near Little Rock, 30 horses and mules were reported killed by the insects within 48 hours. From southeastern Arkansas, about 50 horses and mules were victims, and from the area near Beebe, 175 head.

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## **PERSONALS**

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### **MARRIAGE**

DR. JOHN R. DURIGG (O. S. U. '32), of Oxford, Ohio, to Miss Mabel Viney, of Bath, Ind., April 21, 1934, at Bath, Ind.

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### **BIRTHS**

To DR. and MRS. W. W. THOMPSON of Akron, Ohio, a daughter, Janet Cleone, May 13, 1934.

To DR. and MRS. R. M. PARRY, of Chestertown, Md., a daughter, Margaret Ann, March 28, 1934.

TO DR. and MRS. VICTOR SPEVAK, of Brooklyn, N. Y., a daughter, Marcia, April 9, 1934.

## PERSONALS

DR. W. G. BLAKE (Colo. '11), of Greeley, Colo., is Health Officer of his city.

DR. J. L. MONTTOOTH (Chi. '06), of Morris, Ill., is County Veterinarian of Grundy County.

DR. L. P. GENTRY (Unl. '05), of Ottawa, Kan., holds the official title of City Milk Inspector.

DR. P. M. CELLAR (O. S. U. '31) is assisting Dr. Newell D. Backus (Corn. '05), of Elyria, Ohio.

DR. SAMUEL M. APFELBERG (N. Y.-Amer. '13) is serving as City Veterinarian of Yonkers, N. Y.

DR. ROBERT E. WASHBURN (McK. '09) is Municipal Dairy and Market Inspector of Gloversville, N. Y.

DR. J. B. MCQUOWN (O. S. U. '19), of Tucson, Ariz., is serving as Meat and Milk Inspector of that city.

DR. ARCHIE WHITLOW (Mc. K. '19) reports a change of address from Swea City, Iowa, to Armstrong, same state.

DR. JOHN J. HOGARTY (San Fran. '00), of Oakland, Calif., is County Live Stock Inspector of Alameda County.

DR. G. H. BRUNS (Cin. '10), of East Saint Louis, Ill., has been chosen leading knight of the East Saint Louis Elks Lodge.

DR. H. G. TULLY (Corn. '29) has changed his address from Canoga Park, Calif., to Sherman Oaks Station, Van Nuys, Calif.

DR. ARTHUR C. BOLLE (Chi. '18), of Petersburg, Ill., will locate at Arenzville, Ill., in the near future, for general practice.

DR. THOMAS W. HEALEY (Chi. '06), of San Jose, Calif., is occupying the office of County Veterinarian of Santa Clara County.

DR. L. B. SWINGLEY (Chi. '09), of Oregon, Ill., has been reemployed as veterinarian of Ogle County by the Board of Supervisors.

DR. R. E. GEISLER (Iowa '32) is in charge of the Medical Research Department of the Max Geisler Bird Company, of New York City.

DR. ARCHIE H. FRANK (Mich. '34) has taken over the hospital and practice of the late Dr. W. H. Clemo, at 314 Fort Street, Niles, Mich.

DR. WM. GEO. CHRISMAN (Ont. '02), of the Maryland Live Stock Sanitary Service, addressed the Rotary Club of Ellicott City, Md., on April 6.

DR. T. J. JONES (Ga. '33) is enjoying a growing practice at Covington, Ga., and contemplates building a veterinary hospital in connection with his practice.

DR. L. G. CLARK (K. C. V. C. '07), of Los Angeles, Calif., has been appointed City Veterinarian and Director of Milk and Meat Inspection for that city.

DR. H. E. KREIDLER (U. P. '21), of Rutherford, N. J., is serving his home city and the neighboring city of Lyndhurst as Veterinary Meat and Milk Inspector.

DR. MARK WELSH (Mich. '19), of the Maryland Live Stock Sanitary Service, recently delivered a radio talk on "Living with Pets," over Station WBAL in Baltimore.

DR. H. J. MAGRANE (McK. '13), of Mishawaka, Ind., spoke on the diseases of dogs, at a meeting of the Band of Mercy of the Colfax School, South Bend, Ind., April 23.

DR. D. C. GRINNELL (McK. '11), of Libertyville, Ill., has been appointed to the veterinary staff of the Illinois Department of Agriculture, to conduct tuberculin testing.

DR. A. L. DUCKWORTH (Ga. '32), of Gainesville, Ga., who has been engaged in tuberculosis eradication in Georgia during the past year, has located for practice at Greeneville, Tenn.

DR. E. B. SIMONDS (U. S. C. V. S. '18), B. A. I. inspector in charge of tuberculosis eradication in Maryland, recently talked over Station WBAL in Baltimore, on tuberculosis eradication.

DR. J. W. BENNER (K. S. C. '11), who has been engaged in studying swine diseases at the ranch of the Fontana Farms Company, Fontana, Calif., the past year has returned to Ithaca, N. Y.

DR. PAUL S. DODD (Ind. '18), of Danville, Ill., spoke before the Exchange Club of Danville, April 23. Dr. Dodd, who is Vermillion County Veterinarian, discussed the eradication of bovine tuberculosis.

DR. C. C. WAGNER (O. S. U. '26) has formed a partnership with Dr. Harry B. Roberts (O. S. U. '33), under the name of Drs. Roberts and Wagner Pet Hospital, at 1300 West 117th Street, Cleveland, Ohio.

DR. H. W. KENNECKE (Chl. '16), of Edwardsville, Ill., left his car for a few minutes to go into his office. When he returned, thieves had taken the automobile, and equipment and instruments valued at \$1,000.

DR. W. T. BRINKER (O. S. U. '30) has resigned from the Cleveland Health Department, Cleveland, Ohio, and has located for private practice in Miamisburg, Ohio. He has opened a hospital for small animals at 25 South First Street.

DR. S. F. SCHEIDY (U. P. '29) has resigned his position with the Hershey Creamery Co., of Harrisburg, Pa., to accept a position with Abbott's Dairies, Inc., of Philadelphia, Pa. His new address is 177 Mount Vernon St., Oxford, Pa.

DR. C. M. PRENTICE (O. S. U. '12), of Clyde, Ohio, will retire from active practice in June, at which time Dr. Luther Miller (O. S. U. '34), of Riley Township, Ohio, will take over the practice. Dr. Prentice has practiced in Clyde for 22 years.

DR. W. N. HALL (K. C. V. C. '16), formerly of Kerrville, Tenn., recently opened an office in Covington, Tenn., for general practice. Since 1930, Dr. Hall has been engaged in tuberculosis eradication for the U. S. Bureau of Animal Industry.

DR. GEORGE E. CORWIN (U. S. C. V. S. '03), Deputy Commissioner on Domestic Animals, Hartford, Conn., has been appointed a member of the Connecticut State Board of Veterinary Registration and Examination, for a term of five years, from July 1, 1934, succeeding Dr. John J. Kavanek (T. H. '15).

DR. E. P. JOHNSON (Mich. '25), of the Department of Zoölogy and Animal Pathology, Virginia Polytechnic Institute, was awarded the first prize, consisting of \$50 and given annually, at the twelfth annual meeting of the Virginia Academy of Science, held at Harrisonburg, May 4-5, for his paper, "The Etiology and Histogenesis of Leucosis and Lymphomatosis of Fowls."

